

Publications of B. E. Koel in selected fields

1. Atomic structure of alloy surfaces and metal-oxide interfaces: STM, ALISS, and XPD
2. Chemisorption and reactions at alloy surfaces: Ni-Sn; Pt-Sn, Ge, Fe, Ti; other alloys
3. Catalysis over bimetallic surfaces: Pt-Sn alloys; Cu-Cs
4. Characterization and reactions of nanoparticles
5. Electrode characterization, electrochemical processes, batteries, and fuel cells
6. Nanomanipulation, nanofabrication, plasmonics, and other AFM studies
7. Chemistry at bimetallic surfaces: Ni-Bi, Sn; Rh-K, Sn; Pt-K, Bi, Cu, Zn, Sn, Ge, Fe, Ti
8. Adsorption and reactions on metal surfaces: Pt, Au, Ni, Pd, Rh, Cu, Ag, Ru, Ce
9. Oxides – Adsorption, reaction, structure: MgO(100), SnO_x/Pt, TiO_x/Pt
10. C₆₀ and fulleride thin films
11. Adsorption and reaction of nitrogen dioxide (NO₂)
12. Non-thermal, photon, and electron-induced surface chemistry
13. Structure and reactivity of ultrathin (1-5 monolayer) Pd films: on Nb, Ta, Mo, and Au
14. Other papers in surface science and catalysis
15. Book chapters, application notes, symposia, and book reviews

1. Atomic structure of alloy surfaces and metal-oxide interfaces: STM, ALISS, XPD

240. "Formation of Ge-Pt layer compound on Pt(100)", T. Matsumoto, C.-S. Ho, and B. E. Koel, *J. Amer. Chem. Soc.*, submitted.
235. "Ge overlayer and surface alloy on Pt(100) studied via alkali ion scattering spectroscopy, x-ray photoelectron spectroscopy, and x-ray photoelectron diffraction", T. Matsumoto, C.-S. Ho, M. Batzill, and B. E. Koel, *Phys. Rev. B*, submitted.
232. "STM and LEED observations of a c(2 x 2) Ge overlayer on Pt(100)", T. Matsumoto, M. Batzill, and B. E. Koel, *Surface Sci.*, **603**, 2252-22 (2009).
231. "Formation and Structure of a ($\sqrt{19}\times\sqrt{19}$)R23.4°-Ge/Pt(111) Surface Alloy", C.-S. Ho, S. Banerjee, M. Batzill, D. E. Beck, and B. E. Koel, *Surface Sci.*, **603**, 1161-1167 (2009).
206. "Fundamental studies of titanium oxide-Pt(100) interfaces - II. Influence of oxidation and reduction reactions on the surface structure of TiO_x films on Pt(100)", T. Matsumoto, M. Batzill, S. Hsieh, and B. E. Koel, *Surface Sci.*, **572**, 146-161 (2004).
205. "Fundamental studies of titanium oxide-Pt(100) interfaces - I. Stable high temperature structures formed by annealing TiO_x films on Pt(100)", T. Matsumoto, M. Batzill, S. Hsieh, and B. E. Koel, *Surface Sci.*, **572**, 127-145 (2004).
202. "Epitaxial growth of tin-oxide on Pt(111): Structure and properties of wetting layers and SnO₂-crystallites", M. Batzill, J. Kim, D. E. Beck, and B. E. Koel *Phys. Rev. B*, **69**, 165403-11 (2004).
201. "Metastable surface structures of the bimetallic Sn/Pt(100) system", M. Batzill, D. Beck, and B. E. Koel, *Surface Sci.*, **558**, 35-48 (2004).
200. "Suppressed surface alloying for a bulk-miscible system: Ge on Pt(100)", M. Batzill, T. Matsumoto, C.-S. Ho, and B. E. Koel, *Phys. Rev. B*, **69**, 113401-4 (2004).
198. "Alloy formation and CO adsorption on bimetallic Ca/Pd(111) surfaces", D. I. Jerdev, B. E. Koel, and R. Prins, *J. Phys. Chem. B*, **108 (38)**, 14417-27 (2004).
196. "Thermal stability of ultrathin titanium films on a Pt(111) substrate", S. Hsieh, T. Matsumoto, and B. E. Koel, *Thin Solid Films*, **466**, 123-127 (2004).
195. "Silver on Pt(100)-Room Temperature Growth and High Temperature Alloying," M. Batzill and B. E. Koel, *Surface Sci.*, **553**, 50-60 (2004).
192. "Structural and chemical properties of a c(2x2)-Ti/Pt(100) second-layer alloy – a probe of strong ligand effects on surface Pt atoms", S. Hsieh, T. Matsumoto, M. Batzill, and B. E. Koel, *Phys. Rev. B*, **68**, 205417-1-11 (2003).
186. "Silver on Pt(100): Alloying vs. surface reconstruction - two competing mechanisms to reduce surface stress", M. Batzill and B. E. Koel, *Europhys. Lett.*, **64**, 70-76 (2003).
183. "Fe Deposition on Pt(111): A Route to Fe-Containing Pt-Fe Alloy Surfaces", D. I. Jerdev and B. E. Koel, *Surface Sci.*, 513, L391-L396 (2002).
180. "UHV instrument that combines variable-temperature STM with FT-IRAS for studies of chemical reactions at surfaces," D. Beck, M. Batzill, C. Baur, J. Kim and B. E. Koel, *Rev. Sci. Instr.*, **73**, 1267-72, (2002).
176. "Deposition of Silver on the Pt(100)-hex surface: Kinetic control of alloy formation and composition by surface reconstruction," M. Batzill and B. E. Koel, *Surface Sci.*, 498 (1-2) L85-90 (2002).
172. "Structure of Monolayer Tin Oxide Films on Pt(111) Formed Using NO₂ as an Efficient Oxidant ", M. Batzill, D. Beck, D. Jerdev, B. E. Koel, *Phys. Rev. B*, **64**, 245402/1-10 (2001).
160. "Tin-Oxide Overlayer Formation by Oxidation of Sn/Pt(111) Surface Alloys", M. Batzill, D. E. Beck, D. Jerdev, and B. E. Koel, *J. Vac. Sci. Technol. A*, **19**, 1953-58 (2001).

159. "Self-Organized Molecular-Sized, Hexagonally Ordered SnO_x Nanodot Superlattices on Pt(111)", M. Batzill, D. E. Beck, and B. E. Koel, *Appl. Phys. Lett.*, **78**, 2766-68 (2001).
115. "Probing the Structures of Bimetallic Sn/Rh(111) Surfaces: Alkali Ion Scattering and X-ray Photoelectron Diffraction Studies", Y. Li, M. R. Voss, N. Swami, Y.-L. Tsai, and B. E. Koel, *Phys. Rev. B*, **56**, 15982-94 (1997).
105. "Structural Studies of Sn/Pt(100) Surfaces: Conditions for Alloy Formation", Y. Li and B. E. Koel, *Surface Sci.*, **330**, 193-206 (1995).
101. "Surface Alloy Formation and the Structure of c(2x2)-Sn/Ni(100) Determined by Low Energy Alkali Ion Scattering", Y. D. Li, L. Q. Jiang, and B. E. Koel, *Phys. Rev. B*, **49**, 2813-2820 (1994).
70. "Structure of Metal Overlayers by Low Energy Alkali Ion Scattering: Cu/Ru (0001) and Sn/Pt (111)", S. H. Overbury, D. R. Mullins, M. T. Paffett, and B. E. Koel, in The Structure of Surfaces III, Springer Series in Surface Sciences, Vol. 24, M. A. Van Hove, K. Takayanagi, and X. D. Xie (Eds.), (Springer-Verlag, Heidelberg, 1991), pp. 323-327.
68. "Surface Structural Determination of Sn Deposited on Pt(111) by Low Energy Alkali Ion Scattering", S. H. Overbury, D. R. Mullins, M. T. Paffett, and B. E. Koel, *Surface Sci.*, **254**, 45-57 (1991).
67. "A Multitechnique Surface Science Examination of Sn Deposition on Pt(100)", M. T. Paffett, A. D. Logan, R. J. Simonson, and B. E. Koel, *Surface Sci.*, **250**, 123-138 (1991).

2. Chemisorption and reactions at alloy surfaces: Ni-Sn; Pt-Sn, Ge, Fe, Ti; other alloys

Ni-Sn

104. "Influence of Alloyed Sn Atoms on the Chemisorption Properties of Ni(111) as Probed by RAIRS and TPD Studies of CO Adsorption", C. Xu and B. E. Koel, *Surface Sci.*, **327**, 38-46 (1995).

Pt-Sn

237. "Probing selectivity over Pt-Sn catalysts in reactions of *n*-C₆ hydrocarbons: Adsorption and reactivity of *n*-hexane, 1-hexene, and 1,5-hexadiene on Pt(111) and Sn/Pt(111) surface alloys", H. Zhao and B. E. Koel, *J. Phys. Chem. C*, submitted.
229. "An IRAS study of CO bonding on Sn/Pt(111) surface alloys at maximal pressures of 10 Torr", A. Hightower, M. D. Perez, and B. E. Koel", *Surface Sci.*, **603**, 455-461 (2009).
211. "Hydrogenation of 1,3-butadiene on two ordered Sn/Pt(111) surface alloys", H. Zhao and B. E. Koel, *J. Catal.*, **234**, 24-32 (2005).
210. "Reactivity of Ethyl Groups on a Sn/Pt(111) Surface Alloy", H. Zhao and B. E. Koel, *Catal. Lett.*, **99**, 27-32 (2005).
209. "Influence of coadsorbed hydrogen on ethylene adsorption and reaction on a ($\sqrt{3}\times\sqrt{3}$)R30°-Sn/Pt(111) surface alloy", H. Zhao and B. E. Koel, *Langmuir*, **21**(3), 971-975 (2005).
208. "Adsorption and reaction of bicyclic hydrocarbons at Pt(111) and Sn/Pt(111) surface alloys: trans-decahydronaphthalene (C₁₀H₁₈) and bicyclohexane (C₁₂H₂₂)", H. Zhao and B. E. Koel, *Surface Sci.*, **573**, 413-425 (2004).
207. "Adsorption and reaction of 1,3-butadiene on Pt(111) and Sn/Pt(111) surface alloys", H. Zhao and B. E. Koel, *Surface Sci.*, **572**, 261-268 (2004).
203. "Adsorption and reaction of NO₂ on a ($\sqrt{3}\times\sqrt{3}$)R30° Sn/Pt(111) surface alloy", M. R. Voss, H. Zhao, and B. E. Koel, *Surface Sci.*, **560**, 235-245 (2004).

194. "Probing the Chemistry of CH₃I on Pt-Sn Alloys", C. Panja, E. C. Samano, N. Saliba, H. He, and B. E. Koel, *Surface Sci.*, **553**, 39-49 (2004).
191. "Adsorption and reaction of acetaldehyde on Pt(111) and Sn/Pt(111) surface alloys", H. Zhao, J. Kim and B. E. Koel, *Surface Sci.*, **538**, 147-159 (2003).
171. "Oxidation of Ordered Pt-Sn Surface Alloys by O₂", D. Jerdev and B. E. Koel, *Surface Sci.*, **492**, 106-114 (2001).
165. "Adsorption and Reaction of Gaseous H (D) Atoms with D (H) Adatoms on Pt(111) and Sn/Pt(111) Surface Alloys", H. Busse, M. R. Voss, D. Jerdev, B. E. Koel, *Surface Sci.*, **490**, 133-143 (2001).
157. "Acetylene Chemisorption on Sn/Pt(100) Alloys", C. Panja, N. Saliba, and B. E. Koel, *J. Phys. Chem. B*, **105**, 3786-3796 (2001).
155. "Electronic Contrast in Scanning Tunneling Microscopy of Sn/Pt(111) Surface Alloys", M. Batzill, D. E. Beck, and B. E. Koel, *Surface Sci.*, **466**, L821-L826 (2000).
154. "Coking Resistance of Pt-Sn alloys Probed by Acetylene Chemisorption", C. Panja, N. Saliba, and B. E. Koel, *Catal. Lett.*, **68**, 175-180 (2000).
151. "Influence of Alloyed Sn on Adsorption and Reaction of NO on Pt(100) Surfaces", C. Panja and B. E. Koel, *J. Phys. Chem.*, **104**, 2486-2497 (2000). (Invited Paper)
144. "Control of the Growth of Ordered C₆₀ Films by Chemical Modification of Pt(111) Surfaces", H. He, N. Swami, and B.E. Koel, *Thin Solid Films*, **348**, 30-37 (1999).
141. "Oxidation of Ordered Sn/Pt(111) Surface Alloys and Thermal Stability of the Oxides Formed", N. A. Saliba, Y.-L. Tsai and B. E. Koel, *J. Phys. Chem.*, **B 103**, 1532-1541 (1999).
140. "Ordering and Stabilization of C₆₀ Films on the ($\sqrt{3}\times\sqrt{3}$)R30° Sn/Pt(111) Surface Alloy", N. Swami, H. He and B. E. Koel, *Surface Sci.*, **425**, 141-151 (1999).
136. "Probing the Influence of Alloyed Sn on Pt(100) Surface Chemistry by CO Chemisorption", C. Panja and B.E. Koel, *Israel J. Chem.*, **38**, 365-374 (1998).
134. "Adsorption of Thermal D Atoms on Sn/Pt(111) Surface Alloys", M. R. Voss, H. Busse, and B.E. Koel, *Surface Sci.*, **414**, 330-340 (1998).
130. "Deuterium Dissociation on Ordered Sn/Pt(111) Surface Alloys", P. Samson, A. Nesbitt, B. E. Koel, and A. Hodgson, *J. Chem. Phys.*, **109**, 3255-64 (1998).
122. "A temperature programmed desorption study of the Reaction of Methylacetylene on Pt(111) and Sn/Pt(111) Surface Alloys", J. W. Peck, D. I. Mahon and B. E. Koel, *Surface Sci.*, **410**, 200-213 (1998).
120. "Reactivity of Pt and Pt-Sn Alloy Surfaces Probed by Activation of C₅-C₈ Cycloalkanes via Electron Induced Dissociation (EID) of Multilayers", Y. - L. Tsai and B. E. Koel, *Langmuir*, **14**, 1290-1300 (1998).
119. "TPD Study of the Adsorption and Reaction of Nitromethane and Methyl Nitrite on Ordered Pt-Sn Surface Alloys", J. W. Peck, D. I. Mahon, D. E. Beck, and B. E. Koel, *Surface Sci.*, **410**, 170-188 (1998).
118. "Adsorption of Methanol, Ethanol and Water on Well Characterized Pt-Sn Surface Alloys", C. Panja, N. Saliba, and B. E. Koel, *Surface Sci.*, **395**, 248-259 (1998).
117. "Methyl Nitrite Adsorption as a Novel Route to the Surface Methoxy Intermediate", J. W. Peck, D. Beck, D. Mahon, C. Panja, N. Saliba, and B. E. Koel, *J. Phys. Chem.*, **102**, 3321-3323 (1998).
111. "Temperature Programmed Desorption Investigation of the Adsorption and Reaction of Butene Isomers on Pt(111) and Ordered Pt-Sn Surface Alloys", Y.-L. Tsai and B.E. Koel, *J. Phys. Chem.*, **B101**, 2895-2906 (1997).

110. "Chemisorption of Ethylene, Propylene, and Isobutylene on Ordered Sn/Pt(111) Surface Alloys", Y.-L. Tsai, C. Xu and B.E. Koel, *Surface Sci.*, 385, 37-59 (1997).
108. "Selective Dehydrogenation of 1,3-Cyclohexadiene on Ordered Sn/Pt(111) Surface Alloys", J. W. Peck and B.E. Koel, *J. Amer. Chem. Soc.*, 118, 2708-2717 (1996).
100. "A LEED, TPD, and HREELS Investigation of NO Adsorption on Sn/Pt(111) Surface Alloys", C. Xu and B. E. Koel, *Surface Sci.*, 310, 198-208 (1994).
99. "Probing the Modifier Precursor State: Adsorption of CO on Sn/Pt(111) Surface Alloys", C. Xu and B. E. Koel, *Surface Sci.*, 304, L505-L511 (1994).
98. "Dehydrogenation of Cyclohexene on Ordered Sn/Pt(111) Surface Alloys", C. Xu and B. E. Koel, *Surface Sci.*, 304, 249-266 (1994).
97. "Adsorption of Cyclohexane and Benzene on Ordered Sn/Pt(111) Surface Alloys", C. Xu, Y.-L. Tsai, and B. E. Koel, *J. Phys. Chem.*, 98, 585-593 (1994).
96. "Adsorption and Desorption Behavior of *n*-Butane and Isobutane on Pt(111) and Sn/Pt(111) Surface Alloys", C. Xu, B. E. Koel, and M. T. Paffett, *Langmuir*, 10, 166-171 (1994).
85. "A New Catalysis for Benzene Production from Acetylene under UHV Conditions: Sn/Pt(111) Surface Alloys", C. Xu, J. W. Peck, and B. E. Koel, *J. Amer. Chem. Soc.*, 115, 751-755 (1993).
60. "Chemisorption of CO, H₂, and O₂ on Ordered Sn/Pt(111) Surface Alloys", M. T. Paffett, S. C. Gebhard, R. G. Windham, and B. E. Koel, *J. Phys. Chem.*, 94, 6831-6839 (1990).
48. "Chemisorption of Ethylene on Ordered Sn/Pt(111) Surface Alloys", S. C. Gebhard, R. G. Windham, B. E. Koel, and M. T. Paffett, *Surface Sci.*, 223, 449-464 (1989).

Pt-Ti

227. "Real-time scanning tunneling microscopy observations of the oxidation of a Ti/Pt(111)-(2×2) surface alloy using O₂ and NO₂", S. Hsieh, G. F. Liu, and B. E. Koel, *J. Vac. Sci. Technol.*, A **26**, 1336-1342 (2008).
192. "Structural and chemical properties of a c(2×2)-Ti/Pt(100) second-layer alloy – a probe of strong ligand effects on surface Pt atoms", S. Hsieh, T. Matsumoto, M. Batzill, and B. E. Koel, *Phys. Rev. B*, **68**, 205417-1-11 (2003).

Other alloys

234. Probing the Chemistry of the Engel-Brewer Intermetallic Compound HfIr₃ with H₂, CO and Methylcyclohexane, *Applied Surface Sci.*, submitted.

3. Catalysis over bimetallic surfaces: Pt-Sn alloys; Cu-Cs

Pt-Sn alloys

211. "Hydrogenation of 1,3-butadiene on two ordered Sn/Pt(111) surface alloys", H. Zhao and B. E. Koel, *J. Catal.*, **234**, 24-32 (2005).
193. "Hydrogenation of Cyclohexanone on Pt-Sn Surface Alloys," A. Olivas, D. Jerdev, and B. E. Koel, *J. Catal.*, **222**, 285-292 (2004).
178. "Hydrogenation of Crotonaldehyde over Sn/Pt(111) Alloy Model Catalysts," D. Jerdev, A. Olivas, and B. E. Koel, *J. Catal.*, 205, 278-288 (2002).

Cu-Cs

33. "A Model Study of Alkali Promotion of Water-Gas Shift Catalysts: Cs/Cu(111)", C. T. Campbell and B. E. Koel, *Surface Sci.*, 186, 393-411 (1987).

4. Characterization and reactions of nanoparticles

238. "Simultaneous Oxidation and Reduction of Arsenic by Zero-Valent Iron Nanoparticles: Understanding the Significance of the Composite Structure", M. A. Ramos, W. Yan, X.-Q. Li, B. E. Koel, and W.-X. Zhang, *J. Phys. Chem. C*, submitted.
226. "Determination of the Oxide Layer Thickness in Core-Shell Zero-Valent Iron Nanoparticles", J. Martin, A. Herzing, W. Yan, X. Li, B. Koel, C. Kiely, and W. Zhang, *Langmuir*, **24**, 4329-4334 (2008).
222. "Investigation of the Thermal Stability of 2-D Patterns of Au Nanoparticles", T.-Y. Shih, A. A. G. Requicha, M. E. Thompson, and B. E. Koel, *J. Nanosci. Nanotechnol.*, **7**, 2863-2869 (2007).

5. Electrode characterization, electrochemical processes, batteries, and fuel cells

239. "Improving Electrocatalysts for O₂ Reduction by Fine-tuning the Pt-support Interaction: Pt Monolayer on the Surfaces of a Pd₃Fe(111) Single-Crystal Alloy", W.-P. Zhou, X. Yang, M. Vukmirovic, B. E. Koel, J. Jiao, G. Peng, M. Mavrikakis, and R. Adzic, *J. Amer. Chem. Soc.*, submitted.
228. "A Study of Iodine Adlayers on Polycrystalline Gold Electrodes by in-situ Electrochemical Rutherford Backscattering (ECRBS)", A. Hightower, B. E. Koel, and T. Felter, *Electrochimica Acta*, **54**, 1777-1783 (2009).
221. "Investigation of ruthenium dissolution in advanced membrane electrode assemblies for direct methanol based fuel cell stacks," T. I. Valdez, S. Firdosy, B. E. Koel, and S. R. Narayanan, *ECS Transactions*, **1**(6, *Proton Exchange Membrane Fuel Cells V, in Honor of Supramaniam Srinivasan*), 293-303 (2006).
214. "Demonstration of an In-situ Electrochemical RBS System to Study Electrode-Electrolyte Interfaces", A. Hightower, B. E. Koel, and T. Felter, in *Electrode Processes VII* (From the 206th Meeting of The Electrochemical Society, Honolulu, HI, Oct. 3-8, 2004, ECS Proceedings, Vol. 2004-18), V.I. Birss, D. Evans, M. Josowicz, and M. Osawa (Eds.), (ECS, Pennington, NJ, 2005), p. 46-54.

6. Nanomanipulation, nanofabrication, plasmonics, and other AFM studies

224. "VOXELS: Volume Enclosing Microstructures", R. Gagler, A. Bugacov, B. E. Koel and P. Will, *J. Micromech. Microeng.*, **18**, 055025-30, (2008).
213. "Fabrication of Polystyrene Latex Nanostructures by Nanomanipulation and Thermal Processing," E. Harel, S. E. Meltzer, A. A. G. Requicha, M. E. Thompson, and B. E. Koel, *Nano Lett.*, **5**, 2624-2629 (2005).
190. "Local detection of electromagnetic energy transport below the diffraction limit in metal nanoparticle plasmon waveguides," S. A. Maier, P. G. Kik, H. A. Atwater, S. Meltzer, E. Harel, B. E. Koel, and A. A. G. Requicha, *Nature Materials*, **2**, 229-232 (2003). (Cover article)

187. "Energy transport in metal nanoparticle plasmon waveguides," S. A. Maier, P. G. Kik, L. Sweatlock, H. A. Atwater, J. J. Penninkhof, A. Polman, S. Meltzer, E. Harel, A. A. G. Requicha, and B. E. Koel, *MRS Proc.*, **777**(*Nanostructuring Materials with Energetic Beams*), 129-140 (2003).
182. "Observation of coupled plasmon-polariton modes of plasmon waveguides for electromagnetic energy transport below the diffraction limit," S. A. Maier, P. G. Kik, H. A. Atwater, S. Meltzer, A. A. G. Requicha, and B. E. Koel, *Proceedings of SPIE*, 4810 (2002).
177. "Imaging and Manipulation of Gold Nanorods with an Atomic Force Microscope," S. Hsieh, S. Meltzer, C. R. Wang, A. A. G. Requicha, M. E. Thompson, and B. E. Koel, *J. Phys. Chem. B*; **106**, 231-234 (2002).
175. "Observation of Coupled Plasmon-Polariton Modes of Plasmon Waveguides for Electromagnetic Energy Transport Below the Diffraction Limit", S. A. Maier, P. G. Kik, M. L. Brongersma, H. A. Atwater, S. Meltzer, A. A.G. Requicha, and B. E. Koel, *MRS Proceedings*, **722**, L62 (2001).
174. "Plasmonics - A Route to Nanoscale Optical Devices", S. A. Maier, M. L. Brongersma, P. G. Kik, S. Meltzer, A. A. G. Requicha, B. E. Koel, H. A. Atwater, *Adv. Mater.*, **13**, 1501-1505 (2001). [Erratum published in *Adv. Mater.*, **15**, 562 (2003) concerns the correct author list.]
173. "Manipulation of Nanoscale Components with the AFM: Principles and Applications", A. A. G. Requicha, S. Meltzer, F. P. Teran Arce, J. H. Makaliwe, H. Siken, S. Hsieh, D. Lewis, B. E. Koel, and M. E. Thompson, in: *Proceedings of the 2001 1st IEEE Conference on Nanotechnology*. IEEE-NANO 2001 (Cat. No.01EX516); Piscataway, NJ, USA: IEEE, xxvii+571, p. 81-6 (2001).
167. "Immobilizing Au Nanoparticles on SiO₂ Surfaces using ODS Monolayers", R. Resch, S. Meltzer, T. Vallant, H. Hoffmann, B. E. Koel, A. Madhukar, A. A. G. Requicha, and P. Will, *Langmuir*, **17**, 5666-70 (2001).
161. "Layered nanoassembly of three-dimensional structures", A. A. G. Requicha, S. Meltzer, R. Resch, D. Lewis, B. E. Koel, and M. E. Thompson, in: *Proceedings 2001 ICRA*. IEEE International Conference on Robotics and Automation (Cat. No.01CH37164); Piscataway, NJ, USA : IEEE, 4 vol. xlix+4261, vol. 4, p. 3408-11 (2001).
158. "Fabrication of Nanostructures by Hydroxylamine-Seeding of Gold Nanoparticle Templates", S. Meltzer, R. Resch, B. E. Koel, M. E. Thompson, A. Madhukar, A. A. G. Requicha, and Peter Will, *Langmuir*, **17**, 1713-18 (2001).
152. "Manipulation of gold nanoparticles in liquid environments using scanning force microscopy", R. Resch, D. Lewis, S. Meltzer, N. Montoya, B. E. Koel, A. Madhukar, A. A. G. Requicha, and P. Will, *Ultramicroscopy*, **82**, 135-139 (2000).
150. "Scanning Force Microscopy Study of Etch Pits Formed during Dissolution of a Barite (001) Surface in CDTA and EDTA Solutions," K.-S. Wang, R. Resch, K. Dunn, P. Shuler, Y. Tang, B. E. Koel, and T. F. Yen, *Langmuir*, **16**, 649-655 (2000).
149. "Towards Hierarchical Nanoassembly", A. A. G. Requicha, R. Resch, N. Montoya, B. E. Koel, A. Madhukar, and P. Will, in: *Proceedings 1999 IEEE/RSJ International Conference on Intelligent Robots and Systems*. Human and Environment Friendly Robots with High Intelligence and Emotional Quotients (Cat. No.99CH36289); Piscataway, NJ, USA : IEEE, 3 vol. xxxviii+1925, vol. **2**, p. 889-93 (1999).
148. "Study of the Dissolution of the Barium Sulfate (001) Surface with Hydrochloric Acid by Atomic Force Microscopy," K.-S. Wang, R. Resch, B. E. Koel, P. Shuler, Y. Tang, H. Chen and T. F. Yen, *J. Colloid and Interface Sci.*, 219, 212-215 (1999).

147. "Linking and Manipulation of Gold Multi-Nanoparticle Structures using Dithiols and Scanning Force Microscopy", R. Resch, C. Baur, A. Bugacov, B. E. Koel, P. M. Echternach, A. Madhukar, N. Montoya, A. A. G. Requicha and P. Will, *J. Phys. Chem. B*, **103**, 3647-3650 (1999).
 146. "Measuring the Tip-Sample Separation by Dynamic Force Microscopy", A. Bugacov, R. Resch, C. Baur, N. Montoya, K. Woronowicz, A. Papson, B. E. Koel, A. A. G. Requicha, and P. Will, *Probe Microscopy*, **1**, 345-354 (1999).
 143. "Dissolution of the Barite (001) Surface by the Chelating Agent DTPA as Studied with Non-Contact Atomic Force Microscopy," K.-S. Wang, R. Resch, K. Dunn, P. Shuler, Y. Tang, B. E. Koel, and T. F. Yen, *Colloids and Surfaces A*, **160**(3), 217-227 (1999).
 135. "Building and Manipulating 3-D and Linked 2-D Structures of Nanoparticles Using Scanning Force Microscopy", R. Resch, C. Baur, A. Bugacov, B. E. Koel, A. Madhukar, and A. A. G. Requicha, *Langmuir*, **10**, 6613-6616 (1998). (Cover article)
 133. "Manipulation of Nanoparticles Using Dynamic Force Microscopy: Simulations and Experiments", R. Resch, A. Bugacov, C. Baur, C. Gazen, B. E. Koel, A. Madhukar, A. A. G. Requicha, and P. Will, *Appl. Phys. A, Materials Science & Processing*, **67**, 265-271 (1998). (Invited)
 131. "Nanoparticle Manipulation by Mechanical Pushing: Underlying Phenomena and Real-Time Monitoring", C. Baur, A. Bugacov, B. E. Koel, A. Madhukar, N. Montoya, T. R. Ramachandran, A. A. G. Requicha, R. Resch and P. Will, *Nanotechnology*, **9**, 360-364 (1998). (Cover article)
 129. "Nanorobotic Assembly of Two-Dimensional Structures", A. A. G. Requicha, C. Baur, A. Bugacov, B. C. Gazen, B. E. Koel, A. Madhukar, T. R. Ramachandran, R. Resch, and P. Will, in: *Proceedings 1998 IEEE Internat'l Conf. on Robotics and Automation* (Cat. No.98 CH36146); New York, NY, USA : IEEE, 4 vol. lxxv+3744, vol. 4, p. 3368-74 (1998).
 127. "Imaging and Direct Manipulation of Nanoscale Three-Dimensional Features using the Non-Contact Atomic Force Microscope, T. R. Ramachandran, A. Madhukar, P. Chen, and B. E. Koel, *J. Vac. Sci. Technol. B*, **16**, 1425-1429 (1998).
 125. "Direct and Controlled Manipulation of Nanometer-Sized Particles Using the Non-Contact Atomic Force Microscope", T. R. Ramachandran, C. Baur, A. Bugacov, A. Madhukar, B. E. Koel, A. A. G. Requicha, and B. C. Gazen, *Nanotechnology*, **9**, 237-245 (1998).
 109. "Robotic Nanomanipulation with an SPM in a Networked Computing Environment", C. Baur, B. C. Gazen, B. E. Koel, T. R. Ramachandran, A. A. G. Requicha and L. Zini, *4th Int'l Conf. on Nanometer-Scale Science & Technology, Beijing, P. R. China*, September 8-12, 1996; in *J. Vac. Sci. Technol. B*, **15**, 1577-1580 (1997).
- "Manipulation of gold nanoparticles in liquids using MAC Mode™ Atomic Force Microscopy", R. Resch, N. Montoya, B. E. Koel, A. Madhukar, A. A. G. Requicha, and P. Will, Molecular Imaging Application Notes, Molecular Imaging Corp., Phoenix, AZ (1999).

7. Chemisorption on bimetallic surfaces: Ni-Bi, Sn; Pt-K, Bi

Ni-Bi

153. "Bi Adsorption and Poisoning on Ni(100) Surfaces as Probed by CO Chemisorption", C. Panja, M. E. Jones, J. M. Heitzinger, and B. E. Koel, *J. Phys. Chem.*, **104**, 3130-3139 (2000).
57. "Temperature Programmed Desorption of Bi on Ni(100)", M. E. Jones, J. M. Heitzinger, R. J. Smith, and B. E. Koel, *J. Vac. Sci. Technol.*, **A 8**, 2512-2516 (1990).

Pt-K,Bi

95. "Adsorption Kinetics on Chemically Modified or Bimetallic Surfaces", C. Xu and B. E. Koel, *J. Chem. Phys.*, 100, 664-670 (1994).
93. "Methylcyclohexane to Benzene Conversion over K-promoted Pt(111)", L. Q. Jiang, A. Avoyan, B. E. Koel, and J. L. Falconer, *J. Amer. Chem. Soc.*, 115, 12106-12110 (1993).
78. "Effects of K, O, and H Adatoms on the Adsorption Kinetics of CO on Pt(111)", L. Q. Jiang, B. E. Koel, and J. L. Falconer, *Surface Sci.*, 273, 273-284 (1992).
74. "Influence of Potassium on the Adsorption of H₂ on Pt(111)", S. C. Gebhard and B. E. Koel, *J. Phys. Chem.*, 96, 7056-7063 (1992).
50. "Coadsorption of Ethylene and Potassium on Pt(111). 2. Influence of Potassium on the Decomposition of Ethylene", R. G. Windham and B. E. Koel, *J. Phys. Chem.*, 94, 1489-1496 (1990).
40. "A Multitechnique Surface Analysis Study of the Adsorption of H₂, CO, and O₂ on Bi/Pt(111) Surfaces", M. T. Paffett, C. T. Campbell, R. G. Windham, and B. E. Koel, *Surface Sci.*, 207, 274-296 (1989).
38. "Coadsorption of Ethylene and Potassium on Pt(111). 1. Formation of a π -bonded State of Ethylene", R. G. Windham, M. E. Bartram, and B. E. Koel, *J. Phys. Chem.*, 92, 2862-2870 (1988).
37. "Studies of the Ensemble Size Requirements for Ethylene Adsorption and Decomposition on Pt(111): Ethylene and Bismuth Coadsorption", R. G. Windham, B. E. Koel, and M. T. Paffett, *Langmuir*, 4, 1113-1118 (1988).
31. "Summary Abstract: The Influence of Potassium on Ethylene Adsorption and Decomposition on Pt(111)", R. G. Windham, M. E. Bartram, and B. E. Koel, *J. Vac. Sci. Technol.*, A 5, 457-458 (1987).
27. "Chemical Modification of Surface Properties", B. E. Koel and R. G. Windham, in Proceedings, *Industry-University Advanced Materials Conference*, Denver, CO, J. G. Morse (Ed.), (The Metallurgical Society, Inc., Warrendale, PA, 1987), pp. 77-87.

8. Adsorption and reactions on metal surfaces: Pt, Au, Ni, Pd, Rh, Cu, Ag, Ru, Ce

Pt

236. "Site-blocking effects of preadsorbed H on Pt(111) probed by 1,3-butadiene adsorption and reaction", H. Zhao and B. E. Koel, *Surface Sci.*, submitted.
197. "TPD and HREELS reinvestigation of ethylene oxide adsorption on Pt(111)", J. Kim, H. Zhao, C. Panja, A. Olivas and B. E. Koel, *Surface Sci.*, 564, 53-61 (2004).
181. "Evidence for Slow Oxygen-Exchange Between Multiple Adsorption Sites at High Oxygen Coverages on Pt(111)," D. I. Jerdev, J.-H. Kim, M. Batzill, and B. E. Koel, *Surface Sci.*, 498, L91-L96 (2002).
139. "Polymerization and Decomposition of C₆₀ on Pt(111) Surfaces", N. Swami, H. He, and B.E. Koel, *Phys. Rev. B*, 59, 8283-91 (1999).
138. "Reaction of C₆₀ with Oxygen Adatoms on Pt(111)", H. He, N. Swami, and B. E. Koel, *J. Chem. Phys.*, 110, 1173-1179 (1999).
137. "Oxidation of Pt(111) by Ozone (O₃) Under UHV Conditions", N. A. Saliba, Y.-L. Tsai, C. Panja, and B. E. Koel, *Surface Sci.*, 419, 79-88 (1999).

123. "Thermochemistry of the Selective Dehydrogenation of Cyclohexane to Benzene on Pt Surfaces", B.E. Koel, D. A. Blank, and E. A. Carter, *J. Molecular Catalysis A*, 131, 39-53 (1998).
121. "TPD, HREELS and UPS Study of the Adsorption and Reaction of Methyl Nitrite (CH₃ONO) on Pt(111)", J. W. Peck, D. I. Mahon, D. E. Beck, B. Bansenauer and B. E. Koel, *Surface Sci.*, 410, 214-227 (1998).
112. "Adsorption and Reaction of Nitromethane (CH₃NO₂) on Pt(111)", N. Saliba, J. Wang, B. A. Bansenauer, and B.E. Koel, *Surface Sci.*, 389, 147-161 (1997).
107. "Dehydrogenation of Methylcyclohexane on Pt(111)", C. Xu, B. E. Koel, M. A. Newton, N. A. Frei, and C. T. Campbell, *J. Phys. Chem.*, 99, 16670-16675 (1995).
80. "Hydrocarbon Trapping and Condensation on Pt(111)", L. Q. Jiang and B.E. Koel, *J. Phys. Chem.*, 96, 8694-8697 (1992).
71. "Hydrogen-Induced CO Displacement from the Pt(111) Surface: An Isothermal Kinetic Study", D. H. Parker, D. A. Fischer, J. Colbert, B. E. Koel, and J. L. Gland, *Surface Sci.*, 258, 75-81 (1991).
69. "A Vibrational Study of Borazine Adsorbed on Pt(111) and Au(111) Surfaces", R. J. Simonson, M. T. Paffett, M. E. Jones, and B. E. Koel, *Surface Sci.*, 254, 29-44 (1991).
62. "Hydrogen-Induced Low Temperature CO Displacement from the Pt(111) Surface", D. H. Parker, D. A. Fischer, J. Colbert, B. E. Koel, and J. L. Gland, *Surface Sci.*, 236, L372-L376 (1990).
52. "A Method for Estimating Surface Reaction Energetics: Application to the Mechanism of Ethylene Decomposition on Pt(111)", E. A. Carter and B. E. Koel, *Surface Sci.*, 226, 339-357 (1990).
49. "Electronic Effects of Surface Oxygen on the Bonding of NO to Pt(111)", M. E. Bartram, R. G. Windham, B.E. Koel, and E. A. Carter, *Surface Sci.*, 219, 467-489 (1989).
47. "The Adsorption of Nitric Oxide and Nitrogen Dioxide on Polycrystalline Platinum", D. T. Wickham, B. A. Banse, and B. E. Koel, *Surface Sci.*, 223, 82-100 (1989).
45. "Transient Kinetic Studies of the Catalytic Reduction of NO by CO on Platinum", B. A. Banse, D. T. Wickham, and B. E. Koel, *J. Catal.*, 119, 238-248 (1989).
42. "Study of High Coverages of Atomic Oxygen on the Pt(111) Surface", D. H. Parker, M. E. Bartram, and B. E. Koel, *Surface Sci.*, 217, 489-510 (1989).
35. "Coadsorption of Nitrogen Dioxide and Oxygen on Pt(111)", M. E. Bartram, R. G. Windham, and B. E. Koel, *Langmuir*, 4, 240-246 (1988).
30. "The Molecular Adsorption of Nitrogen Dioxide on Pt(111) Studied by Temperature Programmed Desorption and Vibrational Spectroscopy", M. E. Bartram, R. G. Windham, and B. E. Koel, *Surface. Sci.*, 184, 57-74 (1987).

Au

230. "Investigation of CO oxidation transient kinetics on an oxygen pre-covered Au(211) stepped surface", J. Kim, E. Samano, and B. E. Koel, *Catal. Lett.*, **128**, 263-267 (2009).
223. "Oxidation of Au on vicinal W(110): Role of step edges and facets", A. Varykhalov, O. Rader, V. K. Adamchuk, W. Gudat, B. E. Koel and A. M. Shikin, *Phys. Rev. B*, **75**, 205417-1-8 (2007).
220. "Oxygen adsorption and oxidation reactions on Au(211) surfaces: Exposures using O₂ at high pressures and ozone (O₃) in UHV", J. Kim, E. Samano, and B. E. Koel, *Surface Sci.*, **600**, 4622-4632 (2006).
219. "CO Adsorption and Reaction on Clean and Oxygen-Covered Au(211) Surfaces", J. Kim, E. Samano and B. E. Koel, *J. Phys. Chem. B*, **110**, 17512-17517 (2006).

212. "TPD and FT-IRAS investigation of ethylene oxide (EtO) adsorption on a Au(211) stepped surface", J. Kim and B. E. Koel, *Langmuir*, **21**, 3886-3891 (2005).
184. "Probing the Reactivity of C₆-hydrocarbons on Au Surfaces: Cyclohexane, Cyclohexyl and Cyclohexene Adsorption on Au(111)", D. Syomin and B. E. Koel, *Surface Sci.*, **498**, 61-73 (2002).
179. "IRAS studies of the Orientation of Acetone Molecules in Monolayer and Multilayer Films on Au(111) Surfaces," D. Syomin and B. E. Koel, *Surface Sci.*, **498**, 53-60 (2002).
169. "Monolayer and Multilayer Films of Nitrobenzene on Au(111) Surfaces; Bonding and Geometry", D. Syomin and B.E. Koel, *Surface Sci.*, **495**, L827-L833 (2001).
168. "Coordination and Bonding Geometry of Nitromethane on Au(111) Surfaces", J. Wang, H. Busse, D. Semin, and B.E. Koel, *Surface Sci.*, **494**, L741-7 (2001).
166. "Identification of Adsorbed Phenyl (C₆H₅) Groups on Metal Surfaces: Benzene EID on Au(111)", D. Syomin, B. E. Koel, and G.B. Ellison, *J. Phys. Chem.*, **105**, 8387-8394(2001).
164. "Adsorption of Iodobenzene on the Au(111) Surface and the Production of Biphenyl", D. Syomin and B. E. Koel, *Surface Sci.*, **490**, 265-273 (2001).
162. "Selectivity of Bond-Breaking in Electron-Induced Dissociation (EID) of Hydrocarbon Films on Au Surfaces", D. Syomin and B. E. Koel, *Surface Sci.*, **492**, L693-L699 (2001).
142. "Reactions of N₂O₄ with Ice at Low Temperatures on Au(111) Surfaces", J. Wang and B.E. Koel, *Surface Sci.*, **436**, 15-28 (1999).
132. "IRAS Studies of NO₂, N₂O₃ and N₂O₄ Adsorbed on Au(111) Surfaces and Reactions with Coadsorbed H₂O", J. Wang and B. E. Koel, *J. Phys. Chem. A*, **102**, 8573-8579 (1998). (Invited Paper)
128. "Chemisorbed Oxygen on Au(111) by a Novel Route: NO₂ + H₂O Coadsorption", J. Wang, M. R. Voss, H. Busse, and B. E. Koel, *J. Phys. Chem. B*, **102**, 4693-4696 (1998).
124. "Adsorption of Oxygen on Au(111) by Exposure to Ozone", N. Saliba, D. H. Parker, and B. E. Koel, *Surface Sci.*, **410**, 270-282 (1998).
116. "Nitromethane and Methyl Nitrite Adsorption on Au(111) Surfaces", J. Wang, B. A. Bansenauer, and B. E. Koel, *Langmuir*, **14**, 3255-3263 (1998).
84. "Reactivity of Oxygen Adatoms on the Au(111) Surface", M. A. Lazaga, D. T. Wickham, D. H. Parker, G. N. Kastanas and B. E. Koel, in Catalytic Selective Oxidation, ACS Symposium Series, Vol. 523, S. T. Oyama and J. W. Hightower, Eds., (ACS Books, Washington, 1993), 90-109.
82. "Interaction of Chlorine with the Au(111) Surface in the Temperature Range of 120 - 1000 K", G. N. Kastanas and B. E. Koel, *Appl. Surface Sci.*, **64**, 235-249 (1993).
61. "Adsorption of Nitrogen Dioxide on Polycrystalline Gold", D. T. Wickham, B. A. Banse, and B. E. Koel, *Catal. Lett.*, **6**, 163-172 (1990).
56. "Chemisorption of High Coverages of Atomic Oxygen on the Pt(111), Pd(111), and Au(111) Surfaces", D. H. Parker and B. E. Koel, *J. Vac. Sci. Technol.*, **A 8**, 2585-2590 (1990).
41. "The Molecular Adsorption of NO₂ and the Formation of N₂O₃ on Au(111)", M. E. Bartram and B. E. Koel, *Surface Sci.*, **213**, 137-156 (1989).

90. "Trajectory-Dependent Neutralization of Low Energy Li^+ Scattered from Alkali Adsorbates on Ni(111)", L. Q. Jiang, Y. D. Li, and B. E. Koel, *Phys. Rev. Lett.*, 70, 2649-2652 (1993).
66. "Interpretation of the Carbon Auger Line Shapes for the Adsorption and Decomposition of Ethylene on Ni(100)", F. L. Hutson, D. E. Ramaker, B. E. Koel, and S. C. Gebhard, *Surface Sci.*, 248, 119-133 (1991).
65. "Spectroscopic Evidence for Carbon-Carbon Bonding in "Carbide" Layers on Metals", F. L. Hutson, D. E. Ramaker, and B. E. Koel, *Surface Sci.*, 248, 104-118 (1991).
26. "Auger Lineshape Determination of the Hybridization of Ethylene Adsorbed on Ni(100)", B. E. Koel and D. L. Neiman, *Chem. Phys. Lett.*, 130, 164-169 (1986).
15. "The Adsorption and Decomposition of Ethylene on Ni(100)", B. E. Koel, J. M. White and D. W. Goodman, *Chem. Phys. Lett.*, 88, 236-242 (1982).
14. "Low Temperature Coadsorption of Hydrogen and Carbon Monoxide on Ni(100): II. ELS and XPS Studies", B. E. Koel, D. E. Peebles and J. M. White, *Surface Sci.*, 125, 739-761 (1983).
13. "Low Temperature Coadsorption of Hydrogen and Carbon Monoxide on Ni(100): I. TPD, Df, and UPS Studies", B. E. Koel, D. E. Peebles and J. M. White, *Surface Sci.*, 125, 709-73 (1983).
12. "C(KVV) Auger Line Shape of Chemisorbed CO", B. E. Koel, J. M. White and G. M. Loubriel, *J. Chem. Phys.*, 77, 2665-2669 (1982).
11. "An Electron Spectroscopic Study of Coadsorbed H_2 and CO on Ni(100)", B. E. Koel, D. E. Peebles and J. M. White, *J. Vac. Sci. Technol.*, 20, 889-890 (1982).
8. "The Interaction of Coadsorbed Hydrogen and Carbon Monoxide on Ni(100)", B. E. Koel, D. E. Peebles and J. M. White, *Surface Sci.*, 107, L367-L373 (1981).

Pd

63. "Adsorption of Nitrogen Dioxide and Nitric Oxide on Pd(111)", D. T. Wickham, B. A. Banse, and B. E. Koel, *Surface Sci.*, 243, 83-95 (1991).
59. "Interaction of Oxygen with Pd(111): High Effective O_2 Pressure Conditions by Using Nitrogen Dioxide", B. A. Banse and B. E. Koel, *Surface Sci.*, 232, 275-285 (1990).

Rh

89. "Vibrational and Electronic Properties of Monolayer and Multilayer C_{60} Films on Rh(111)", A. Sellidj and B. E. Koel, *J. Phys. Chem.*, 97, 10076-10082 (1993).
28. "Bonding and Thermal Decomposition of Propylene, Propadiene, and Methylacetylene on the Rh(111) Single-Crystal Surface", B. E. Bent, C. M. Mate, J. E. Crowell, B. E. Koel, and G. A. Somorjai, *J. Phys. Chem.*, 91, 1493-1502 (1987).
25. "Thermal Decomposition of Benzene on the Rh(111) Crystal Surface", B. E. Koel, J. E. Crowell, C. M. Mate, B. E. Bent, and G. A. Somorjai, *J. Phys. Chem.*, 90, 2949-2956 (1986).
21. "Hydrogenation and H,D Exchange Studies of Ethylidyne (CCH_3) on Rh(111) Crystal Surfaces at 1 atm. Pressure Using High Resolution Electron Energy Loss Spectroscopy", B. E. Koel, B. E. Bent and G. A. Somorjai, *Surface Sci.*, 146, 211-228 (1984).
20. "A High Resolution Electron Energy Loss Spectroscopy Study of the Surface Structure of Benzene Adsorbed on the Rh(111) Crystal Face", B. E. Koel, J. E. Crowell, C. M. Mate and G. A. Somorjai, *J. Phys. Chem.*, 88, 1988-1996 (1984).

19. "LEED and HREELS Studies of Benzene Adsorbed on Rh(111)", M. A. Van Hove, R. Lin, R. J. Koestner, B. E. Koel, M. Mate, J. E. Crowell and G. A. Somorjai, *Vacuum*, 33, 860-861 (1983).
17. "Vibrational Spectroscopy Using HREELS of Benzene Adsorbed on the Rh(111) Crystal Surface", B. E. Koel and G. A. Somorjai, *J. Electron Spectrosc. Relat. Phenom.*, 29, 287-292 (1983).

Cu

64. "Methyl Chloride and Trichlorosilane Adsorption on Cu(110)", K. A. Magrini, S. Gebhard, B. E. Koel, and J. L. Falconer, *Surface Sci.*, 248, 93-103 (1991).
58. "Interaction of Dimethylamine with Clean and Partially Oxidized Copper Surfaces", J. A. Kelber, J. W. Rogers, Jr., B. A. Banse, and B. E. Koel, *Appl. Surface Sci.*, 44, 193-204 (1990).
32. "Surface Science Studies of the Water-Gas Shift Reaction on a Model Cu(111) Catalyst", C. T. Campbell, B. E. Koel, and K. A. Daube, *J. Vac. Sci. Technol.*, A 5, 810-813 (1987).
29. "H₂S/Cu(111): A Model Study of Sulfur Poisoning of Water Gas Shift Catalysts", C. T. Campbell and B. E. Koel, *Surface Sci.*, 183, 100-112 (1987).

Ag

77. "Low Energy Electron Induced Chemistry: C₂H₅Cl on Ag(111)", X.-L. Zhou, P. M. Blass, B. E. Koel, and J. M. White, *Surface Sci.*, 271, 452-467 (1992).
76. "Low Energy Electron Induced Chemistry: CH₃Cl on Ag(111)", X.-L. Zhou, P. M. Blass, B. E. Koel, and J. M. White, *Surface Sci.*, 271, 427-451 (1992).
54. "Determination of the Reaction Order and Activation Energy for Desorption Kinetics Using TPD Spectra: Application to D₂ Desorption from Ag(111)", D. Parker, M. E. Jones and B. E. Koel, *Surface Sci.*, 233, 65-74 (1990).
44. "Chemisorption of Atomic Hydrogen on Clean and Cl-covered Ag(111)", X. - L. Zhou, J. M. White and B. E. Koel, *Surface Sci.*, 218, 201-210 (1989).
23. "Chlorine Promotion of Selective Ethylene Oxidation over Ag(110): Kinetics and Mechanism", C. T. Campbell and B. E. Koel, *J. Catal.*, 92, 272-283 (1985).

Ru

9. "Water-Induced Effects on CO Adsorption on Ru(001)", H.-I. Lee, B. E. Koel, W. M. Daniel and J. M. White, *J. Catal.*, 74, 192-195 (1982).
4. "Incorporation of Oxygen Chemisorbed on Ru(001)", G. Praline, B. E. Koel, H.-I. Lee and J. M. White, *Applications of Surface Sci.* 5, 296-312 (1980).
3. "The Behavior of H₂O, CO, and O₂ on the Basal Plane of Ruthenium", H.-I. Lee, W. M. Daniel, G. Praline, B. E. Koel and J. M. White, *Kinam*, 2A, 45-79 (1980).
1. "Oxygen Chemisorption on a Stepped Ru(001) Crystal", S. L. Parrott, G. Praline, B. E. Koel, J. M. White and T. N. Taylor, *J. Chem. Phys.*, 71, 3352-3354 (1979).

Ce

10. "Resonant Photon-Stimulated Desorption of Ions from Oxidized Cerium", B. E. Koel, G. Loubriel, M. L. Knotek, R. H. Stulen, R. A. Rosenberg and C. C. Parks, *Phys. Rev.*, B 25, 5551-5554 (1982).
6. "X-ray Photoelectron Study of the Reaction of Water with Cerium", B. E. Koel, G. Praline, H.-I. Lee, J. M. White and R. L. Hance, *J. Electron Spectrosc. Relat. Phenom.*, 21, 31-46 (1980).

5. "X-ray Photoelectron Study of the Reaction of Oxygen with Cerium", G. Praline, B. E. Koel, R. L. Hance, H.-I. Lee and J. M. White, *J. Electron Spectrosc. Relat. Phenom.*, 21, 17-30 (1980).

9. Oxides – Adsorption, reaction and structure: MgO(100), SnO_x/Pt, TiO_x/Pt

MgO

106. "Adsorption and Reaction of CH₃COOH and CD₃COOD on the MgO(100) Surface: An FTIR and TPD Study", C. Xu and B. E. Koel, *J. Chem. Phys.*, **102**, 8158-8166 (1995).

TiO_x/Pt

206. "Fundamental studies of titanium oxide-Pt(100) interfaces - II. Influence of oxidation and reduction reactions on the surface structure of TiO_x films on Pt(100)", T. Matsumoto, M. Batzill, S. Hsieh, and B. E. Koel, *Surface Sci.*, **572**, 146-161 (2004).
205. "Fundamental studies of titanium oxide-Pt(100) interfaces - I. Stable high temperature structures formed by annealing TiO_x films on Pt(100)", T. Matsumoto, M. Batzill, S. Hsieh, and B. E. Koel, *Surface Sci.*, **572**, 127-145 (2004).

SnO_x/Pt

202. "Epitaxial growth of tin-oxide on Pt(111): Structure and properties of wetting layers and SnO₂-crystallites", M. Batzill, J. Kim, D. E. Beck, and B. E. Koel, *Phys. Rev. B*, **69**, 165403-11 (2004).
172. "Structure of Monolayer Tin Oxide Films on Pt(111) Formed Using NO₂ as an Efficient Oxidant ", M. Batzill, D. Beck, D. Jerdev, B. E. Koel, *Phys. Rev. B*, **64**, 245402/1-10 (2001).
171. "Oxidation of Ordered Pt-Sn Surface Alloys by O₂", D. Jerdev and B. E. Koel, *Surface Sci.*, **492**, 106-114 (2001).
160. "Tin-Oxide Overlayer Formation by Oxidation of Sn/Pt(111) Surface Alloys", M. Batzill, D.E. Beck, D. Jerdev, and B.E. Koel, *J. Vac. Sci. Technol. A*, **19**, 1953-58 (2001).
159. "Self-Organized Molecular-Sized, Hexagonally Ordered SnO_x Nanodot Superlattices on Pt(111)", M. Batzill, D. E. Beck, and B.E. Koel, *Appl. Phys. Lett.*, **78**, 2766-68 (2001).

10. C₆₀ and fulleride thin films

145. "Electrical Properties of K-doped Superfulleride Thin Films ", N. Swami, M. E. Thompson, and B.E. Koel, *J. Appl. Phys.*, **85**, 3696-700 (1999).
144. "Control of the Growth of Ordered C₆₀ Films by Chemical Modification of Pt(111) Surfaces", H. He, N. Swami, and B.E. Koel, *Thin Solid Films*, **348**, 30-37 (1999).
140. "Ordering and Stabilization of C₆₀ Films on the (√3×√3)R30° Sn/Pt(111) Surface Alloy", N. Swami, H. He and B. E. Koel, *Surface Sci.*, **425**, 141-151 (1999).
139. "Polymerization and Decomposition of C₆₀ on Pt(111) Surfaces", N. Swami, H. He, and B. E. Koel, *Phys. Rev. B*, **59**, 8283-91 (1999).
138. "Reaction of C₆₀ with Oxygen Adatoms on Pt(111)", H. He, N. Swami, and B. E. Koel, *J. Chem. Phys.*, **110**, 1173-1179 (1999).
126. "Growth and Characterization of Potassium-doped Superfulleride Thin Films", N. Swami, Y. You, M. E. Thompson, and B.E. Koel, *J. Vac. Sci. Technol. A*, **16**, 2395-2399 (1998).

103. "Superfulleride Formation and Electronic Properties of C₆₀ on K/Rh(111) Surfaces, L. Q. Jiang and B.E. Koel, *Chem. Phys. Lett.*, 223, 69-75 (1994).
94. "Charge Transfer from Potassium into the t_{1g} Band of C₆₀", L. Q. Jiang and B. E. Koel, *Phys. Rev. Lett.*, 72, 140-143 (1994).
89. "Vibrational and Electronic Properties of Monolayer and Multilayer C₆₀ Films on Rh(111)", A. Sellidj and B. E. Koel, *J. Phys. Chem.*, 97, 10076-10082 (1993).

11. Adsorption and reaction of nitrogen dioxide (NO₂)

142. "Reactions of N₂O₄ with Ice at Low Temperatures on Au(111) Surfaces", J. Wang and B.E. Koel, *Surface Sci.*, 436, 15-28 (1999).
63. "Adsorption of Nitrogen Dioxide and Nitric Oxide on Pd(111)", D. T. Wickham, B. A. Banse, and B. E. Koel, *Surface Sci.*, 243, 83-95 (1991).
61. "Adsorption of Nitrogen Dioxide on Polycrystalline Gold", D. T. Wickham, B. A. Banse, and B. E. Koel, *Catal. Lett.*, 6, 163-172 (1990).
53. "Reactions of the Adsorption Isomers of Nitrogen Dioxide on Well-Defined Surfaces", B. E. Koel, in *Chemically Modified Surfaces*, Vol. 3, D. E. Leyden (Ed.), (Gordon and Breach, 1990), pp. 189-194.
47. "The Adsorption of Nitric Oxide and Nitrogen Dioxide on Polycrystalline Platinum", D. T. Wickham, B. A. Banse, and B. E. Koel, *Surface Sci.*, 223, 82-100 (1989).
41. "The Molecular Adsorption of NO₂ and the Formation of N₂O₃ on Au(111)", M. E. Bartram and B. E. Koel, *Surface Sci.*, 213, 137-156 (1989).
39. "Steady-State Kinetics of the Catalytic Reduction of Nitrogen Dioxide by Carbon Monoxide on Platinum", D. T. Wickham and B. E. Koel, *J. Catal.*, 114, 207-216 (1988).
36. "Summary Abstract: NO₂ Chemisorption: An Example of Surface Linkage Isomerism", M. E. Bartram and B. E. Koel, *J. Vac. Sci. Technol.*, A 6, 782-784 (1988).
35. "Coadsorption of Nitrogen Dioxide and Oxygen on Pt(111)", M. E. Bartram, R. G. Windham, and B. E. Koel, *Langmuir*, 4, 240-246 (1988).
30. "The Molecular Adsorption of Nitrogen Dioxide on Pt(111) Studied by Temperature Programmed Desorption and Vibrational Spectroscopy", M. E. Bartram, R. G. Windham, and B. E. Koel, *Surface. Sci.*, 184, 57-74 (1987).

12. Non-thermal, photon, and electron-induced surface chemistry

215. "Desorption of Chemisorbed Carbon on Mo(100) by Noble Gas Ion Sputtering: Validation of Ground Test Measurements of Ion Engine Lifetimes," C.-S. Ho, S. Banerjee, B. E. Koel, O. B. Duchemin, and J. E. Polk, *Appl. Surface Sci.*, **252**, 2657-2664 (2006).
166. "Identification of Adsorbed Phenyl (C₆H₅) Groups on Metal Surfaces: Benzene EID on Au(111)", D. Syomin, B. E. Koel, and G.B. Ellison, *J. Phys. Chem.*, 105, 8387-8394(2001).
162. "Selectivity of Bond-Breaking in Electron-Induced Dissociation (EID) of Hydrocarbon Films on Au Surfaces", D. Syomin and B. E. Koel, *Surface Sci.*, 492, L693-L699 (2001).
120. "Reactivity of Pt and Pt-Sn Alloy Surfaces Probed by Activation of C₅-C₈ Cycloalkanes via Electron Induced Dissociation (EID) of Multilayers", Y.-L. Tsai and B. E. Koel, *Langmuir*, 14, 1290-1300 (1998).

114. "Importance of Hydrocarbon Fragment Diffusion in the Formation of Adsorbed Alkyls via EID of Multilayers on Pt(111)", Y.-L. Tsai and B.E. Koel, *J. Phys. Chem.*, 101, 4781-4786 (1997).
91. "Electron-Induced Dissociation of Hydrocarbon Multilayers", C. Xu and B.E. Koel, *Surface Sci.*, 292, L803-L809 (1993).
77. "Low Energy Electron Induced Chemistry: C₂H₅Cl on Ag(111)", X.-L. Zhou, P. M. Blass, B. E. Koel, and J. M. White, *Surface Sci.*, 271, 452-467 (1992).
76. "Low Energy Electron Induced Chemistry: CH₃Cl on Ag(111)", X.-L. Zhou, P. M. Blass, B. E. Koel, and J. M. White, *Surface Sci.*, 271, 427-451 (1992).
18. "Photon- and Electron-Stimulated Desorption from Rare Earth Oxides", G. Loubriel, M. L. Knotek, R. H. Stulen, B. E. Koel, and C. C. Parks, *J. Vac. Sci. Technol. A* 1, 1145-1148 (1983)
16. "Hydrogen Surface Segregation on Si(111) by Photon Stimulated Desorption at the Si K-Edge", M. L. Knotek, G. M. Loubriel, R. H. Stulen, C. C. Parks and B. E. Koel, *Phys. Rev.*, B 26, 2292-2295 (1982).
10. "Resonant Photon-Stimulated Desorption of Ions from Oxidized Cerium", B. E. Koel, G. Loubriel, M. L. Knotek, R. H. Stulen, R. A. Rosenberg and C. C. Parks, *Phys. Rev.*, B 25, 5551-5554 (1982).
2. "Photoeffects on Reactions over Transition Metals", B. E. Koel, J. M. White, J. L. Erskine and P. R. Antoniewicz, in Advances in Chemistry Series No. 184, Interfacial Photoprocesses: Energy Conversion and Synthesis, M. S. Wrighton (Ed.) (ACS, Washington, D. C., 1980), pp. 27-45.

13. Structure and reactivity of ultrathin (1-5 monolayer) Pd films: on Nb, Ta, Mo, and Au

170. "Tuning the Chemistry of Metal Surfaces: II. Acetylene Cyclotrimerization on Ultrathin Pd Films on Ta(110)", D. E. Beck, J.M. Heitzinger and B.E. Koel, *Surface Sci.*, 491, 63-76 (2001).
163. "Tuning the Chemistry of Metal Surfaces: I. Adsorption and Reaction of NO and N₂O on Ultrathin Pd Films on Ta(110)", D. E. Beck, J. M. Heitzinger, A. Avoyan, and B.E. Koel, *Surface Sci.*, 491, 48-62 (2001).
102. "Electronic and CO Chemisorption Properties of Ultrathin Pd Films Vapor-Deposited on Au(111)", A. Sellidj and B. E. Koel, *Phys. Rev. B*, 49, 8367-8376 (1994).
88. "Chemisorption of Ethylene and Acetylene on Ultrathin Pd Films on Mo(100)", J. M. Heitzinger, S. C. Gebhard, and B. E. Koel, *J. Phys. Chem.*, 97, 5327-5332 (1993).
87. "CO Chemisorption Properties of Ultrathin Pd Films on Ta(110)", A. Sellidj and B. E. Koel, *Surface Sci.*, 284, 139-153 (1993).
86. "Hydrogen Adsorption and Absorption on Ultrathin Pd Films on Ta(110)", J. M. Heitzinger, A. Avoyan, and B. E. Koel, *Surface Sci.*, 294, 251-264 (1993).
83. "Growth Mechanism and Structure of Ultrathin Pd Films Vapor-Deposited on Ta(110)", A. Sellidj and B. E. Koel, *Surface Sci.*, 281, 223-233 (1993).
81. "Chemisorption of Hydrogen on Ultrathin Pd Films on Mo(100)", J. M. Heitzinger, S. C. Gebhard, and B. E. Koel, *Chem. Phys. Lett.*, 200, 65-70 (1992).
79. "Chemisorption of CO on Ultrathin Films of Pd on Mo(100)", J. M. Heitzinger, S. C. Gebhard, and B. E. Koel, *Surface Sci.*, 275, 209-222 (1992).
75. "Ultrathin Films of Pd on Au(111): Evidence for Surface Alloy Formation", B. E. Koel, A. Sellidj, and M. T. Paffett, *Phys. Rev. B*, 46, 7846-7856 (1992).

73. "Growth Mechanism and Structure of Ultrathin Palladium Films Formed by Deposition on Mo(100)", J. M. Heitzinger, S. C. Gebhard, D. H. Parker, and B. E. Koel, *Surface Sci.*, 260, 151-162 (1992).
55. "The Adsorption of CO on Pd Thin Films on Ta(110)", B. E. Koel, R. Smith, and P. J. Berlowitz, *Surface Sci.*, 231, 325-332 (1990).
34. "Surface Chemistry of Thin Palladium Films", D. L. Neiman and B. E. Koel, in *Physical and Chemical Properties of Thin Metal Overlayers and Alloy Surfaces*, D. M. Zehner and D. W. Goodman (Eds.), (Materials Research Society, Pittsburgh, PA, 1988), p. 143-153.

14. Other papers in surface science and catalysis

Catalysis

216. "Fractional factorial study of HCN removal over a 0.5% Pt/Al₂O₃ catalyst: Effects of temperature, gas flow rate, and reactant partial pressure", H. Zhao, R. G. Tonkyn, S. E. Barlow, C. H. F. Peden, and B. E. Koel, *Ind. Eng. Chem. Res.*, **45**, 934-939 (2006).
217. "Catalytic oxidation of HCN over a 0.5% Pt/Al₂O₃ catalyst", H. Zhao, R. G. Tonkyn, S. E. Barlow, B. E. Koel, and C. H. F. Peden, *Applied Catalysis B: Environmental*, **65**, 282-290 (2006).
92. "Model Reaction Studies of the Direct Synthesis of Methylchlorosilanes", K. A. Magrini, J. L. Falconer and B. E. Koel, in *Catalyzed Direct Reactions of Silicon*, K. M. Lewis and D. G. Rethwisch (Eds.), (Elsevier, 1993), 249-264 .
43. "Direct Formation of (CH₃)₂HSiCl from Si and CH₃Cl", K. A. Magrini, J. L. Falconer and B. E. Koel, *J. Phys. Chem.*, 93, 5563-5568 (1989).

Surface science

204. "Nanofiltration of natural organic matter with H₂O₂/UV pretreatment: fouling mitigation and membrane surface characterization", W. Song, V. Ravindran, B. E. Koel, and M. Pirbazari, *J. Membrane Sci.*, **241**, 143-160 (2004).
199. "Desorption Energies of Linear and Cyclic Alkanes on Surfaces: Anomalous Scaling with Length," R. Z. Lei, A. J. Gellman, and B. E. Koel, *Surface Sci.*, **554**, 125-140 (2004).
185. "Field emission array cathode material selection for compatibility with electric propulsion applications," C. M. Marrese-Reading, J. Polk, W. A. Mackie, C. Dandeneau, B. E. Koel, and M. Quinlan, *Proc. ECS*, **2002-18**(*Cold Cathodes*), 137-157 (2002).
156. "The Effect of Carbon Deposition on Accelerator Grid Wear Rates in Ion Engine Ground Testing", J. E. Polk, O. B. Duchemin, C.-S. Ho, and B. E. Koel, in *Proc. 36th Joint Propulsion Conference*, Huntsville, AL, 2000. AIAA-2000-3662 (pp.1-17).
51. "A Comprehensive Investigation of HCl- and Br₂/NH₃(aq)-Etched p-InP Interfaces", P. R. Segar, C. A. Koval, B. E. Koel and S. C. Gebhard, *J. Electrochem. Soc.*, 137, 544-552 (1990).
46. "Small Scale Electrochemical Cleaning of Molybdenum to Improve Spot-Welding Characteristics", M. E. Jones, B. E. Koel, and R. T. Weppner, *Rev. Sci. Instrum.*, 60, 3067-3068 (1989).
24. "Vibrational Spectroscopy of Adsorbed Monolayers", B. E. Koel, *Scanning Electron Microsc.*, 1985 Vol. IV, 1421-1440, (1985).
7. "Interference of O K_α Ghost Features in X-ray Excited Auger Spectra", B. E. Koel and J. M. White, *J. Electron Spectrosc. Relat. Phenom.*, 22, 237-245 (1981).

15. Book chapters, application notes, symposia, and book reviews

233. Chapter: “Structure, Characterization and Reactivity of Pt-Alloy Surfaces”, B. E. Koel, in *Model Systems in Catalysis: From Single Crystals and Size Selected Clusters to Supported Enzyme Mimics*, R. M. Rioux (Ed.), (Springer, 2009), in press.
225. Chapter 5.3.4 “Promoters and Poisons”, B. E. Koel and J. Kim, in *Handbook of Heterogeneous Catalysis*, 2nd Edition, G. Ertl, H. Knözinger, F. Schüth, and J. Weitkamp (Eds.), (VCH, Weinheim, Germany, 2008), pp. 1593-1624.
218. Chapter 3.8.4 “Adsorbed CO₂, NO₂, O₃, SO₂, OCS, and N₂O on Metals”, C. Panja, J. Kim, E. C. Samano, and B. E. Koel, in *Adsorbed Layers on Surfaces*, Landolt-Bornstein Volume III/42, H. Bonzel (Ed.), (Springer-Verlag, Berlin-Heidelberg, 2006), pp. 170-241.
189. Chapter 25 “Surfaces and Films”, B. E. Koel and R. Resch, in *Physics Desk Reference*, 3rd ed., edited by E. R. Cohen, D. R. Lide, and G. L. Trigg (AIP Press, New York, 2003), pp. 756-790.
188. “State-of-the-art characterization of single-crystal surfaces—a view of nanostructures”, M. Batzill, S. Banerjee, and B. E. Koel, in *Catalysis and Electrocatalysis at Nanoparticle Surfaces*, A. Wieckowski, E. R. Savinova, and C. G. Vayenas (Eds.), (Marcel Dekker Inc., New York, 2003), pp. 109-169.
113. “Surface Processes”, H. Busse and B. E. Koel, *Encyclopedia of Applied Physics*, Vol. 20, (VCH Publishers, Weinheim, 1997) pp. 273-309.
72. “High Resolution Electron Energy Loss Spectroscopy (HREELS)”, B. E. Koel, in *Encyclopedia of Materials Characterization: Surfaces, Interfaces, Thin Films*, C. R. Brundle, C.A. Evans, Jr., and S. Wilson, Eds., (Butterworth, 1992), pp. 442-459.
22. Chapter 3 “Surface Structural Chemistry”, B. E. Koel and G. A. Somorjai, in *Catalysis: Science and Technology*, Vol. 7, J. R. Anderson and M. Boudart, (Eds.), (Springer-Verlag, New York, 1985), pp. 159-218.
2. “Photoeffects on Reactions over Transition Metals”, B. E. Koel, J. M. White, J. L. Erskine and P. R. Antoniewicz, in *Advances in Chemistry Series No. 184, Interfacial Photoprocesses: Energy Conversion and Synthesis*, M. S. Wrighton (Ed.) (ACS, Washington, D. C., 1980), pp. 27-45.
- “Manipulation of gold nanoparticles in liquids using MAC Mode™ Atomic Force Microscopy”, R. Resch, N. Montoya, B. E. Koel, A. Madhukar, A. A. G. Requicha, and P. Will, Molecular Imaging Application Notes, Molecular Imaging Corp., Phoenix, AZ (1999).
- “Book Review for Heterogeneous Reaction Dynamics. By Steven L. Bernasek VCH, Weinheim, 1995”, B. E. Koel, *J. Catal.*, **163**, 506 (1996).
- “Symposium on Bimetallic Surface Chemistry and Catalysis: Preface”, B. E. Koel and C. T. Campbell, *Langmuir*, **4**, 1075-1076 (1988).