## Contents

1. Catalytic Chemistry of Hydrocarbon Conversion on Metallic Single Crystals
   Wilfred T. Tysoe
   1

2. Structure, Characterization and Reactivity of Pt–Sn Surface Alloys
   Bruce E. Koel
   29

3. Catalysis at Bimetallic Electrochemical Interfaces
   Vojislav R. Stamenkovic and Nenad M. Markovic
   51

4. Enantioselectivity on Naturally Chiral Metal Surfaces
   Andrew J. Gellman
   75

5. Chiral Expression by Organic Architectures at Metal Surfaces: the Role of Both Adsorbate and Surface in Inducing Asymmetry
   M. Forster and R. Raval
   97

6. Role of C and P Sites on the Chemical Activity of Metal Carbides and Phosphides: From Clusters to Single-Crystal Surfaces
   José A. Rodriguez, Francesc Viñes, Ping Liu, and Francesc Illas
   117

7. Surface Reactions of Oxygen Containing Compounds on Metal Oxide (TiO₂ and UO₂) Single Crystals
   Hicham Idriss
   133

8. Surface Science Studies of Strong Metal-Oxide Interactions on Model Catalysts
   Michael Bowker and Roger A. Bennett
   155
Contents

9 Surface Thermodynamics: Small Molecule Adsorption Calorimetry on Metal Single Crystals ........................................... 175
  Vittorio Fiorin, David Borthwick, and David A. King

10 Surface Femtochemistry ......................................................................... 203
  Ellen H.G. Backus and Mischa Bonn

11 The Incorporation of Added Metal Atoms into Structures of Reaction Intermediates on Catalytic Metal Surfaces ................. 223
  Ling Zhou and Robert J. Madix

12 Chemical Bonding on Metal Surfaces ................................................... 253
  Anders Nilsson and Lars Gunnar Moody Pettersson

13 From Molecular Insights to Novel Catalysts Formulation ................. 275
  Eranda Nikolla and Suljo Linic

14 The Reactivity of Gas-Phase Metal Oxide Clusters: Systems for Understanding the Mechanisms of Heterogeneous Catalysts ........................................................................ 293
  Nelly M. Reilly, Grant E. Johnson, and A.W. Castleman Jr.

15 Catalysis by Noble Metal Nanoparticles Supported on Thin-Oxide Films ................................................................. 319
  Günther Rupprechter

16 Catalysis by Supported Size-Selected Clusters .................................. 345
  Randall Meyer, Yu Lei, Sungsik Lee, and Stefan Vajda

17 Catalysis by Thin Oxide Films and Oxide Nanoparticles ................. 367
  Günther Rupprechter and Simon Penner

18 Catalysis with Transition Metal Nanoparticles in Colloidal Solution: Heterogeneous or Homogeneous? ...................... 395
  Christopher Tabor, Radha Narayanan, and Mostafa A. El-Sayed

19 Well-Defined Metallic and Bimetallic Clusters Supported on Oxides and Zeolites ......................................................... 415
  Javier Guzman

20 A Convergence of Homogeneous and Heterogeneous Catalysis: Immobilized Organometallic Catalysts......................... 441
  Rebecca A. Shiels and Christopher W. Jones
Contents

21 Single-Site Heterogeneous Catalysts: Innovations, Advantages, and Future Potential in Green Chemistry and Sustainable Technology .................................................. 457
   Robert Raja and John Meurig Thomas

22 Molecular-Imprinted Metal Complexes for the Design of Catalytic Structures .................................................. 475
   Mizuki Tada and Yasuhiro Iwasawa

23 Heterogeneous Catalyst Design by Multiple Functional Group Positioning in Organic–Inorganic Materials: On the Route to Analogs of Multifunctional Enzymes ................. 495
   Eric L. Margelefsky, Ryan K. Zeidan, and Mark E. Davis

Index ......................................................................................................................................................... 517
Model Systems in Catalysis
Single Crystals to Supported Enzyme Mimics
Rioux, R. (Ed.)
2010, XIX, 526 p., Hardcover