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## Wei Wang, Ph.D., Staff Scientist

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**Specializations:** Physical Chemistry, Analytical Chemistry, Nano-materials Chemistry, Applied Spectroscopy

### **Educations:**

- 1987–1993: Ph.D., Changchun Institute of Applied Chemistry, Chinese Academy of Sciences.  
(Dissertation: Structural and Vibrational Spectroscopic Studies of Mimetic Bio-membrane Systems)
- 1979–1983: B.S., Department of Chemistry, Shandong Normal University, China.

### **Research Interests:**

- Synthesis, characterization and self-assembly of various composite nanoparticles with novel optical, electronic, magnetic, thermal, and mechanical properties.
- Fabrication of novel nanocatalysts and inorganic/organic hybrid membranes for applications in photovoltaic solar cells, proton exchange membrane fuel cells, solar hydrogen production, photocatalytic fuel formation, and photodegradation of organic pollutants.
- Development of new nanomaterial-based intelligent sensors for nonlinear optical switching, biological species identification, trace chemical detection, and environmental contaminant monitoring.
- Probing interfacial processes at nanoscales in complex environmental systems with advanced neutron and spectroscopic techniques (small-angle neutron scattering, small-angle X-ray scattering, neutron reflectometry, surface enhanced Raman scattering, and fluorescence, etc.)

### **Currently Participated Projects:**

- Nanoscale Complexity at the Oxide-Water Interface (Co-principal Investigator), Office of Basic Energy Sciences, U.S. Department of Energy.
- Effects of Confinement on the Statistical Physics of Nanoparticles – From Idealized Models to Real Materials: Application to Antiferromagnetic Oxides (Co-principal Investigator), LDRD Fund, ORNL.
- Scalable Surface Enhanced Raman Spectroscopy (SSERS) for Single Molecule Detection and Characterization (Contributing Investigator), Seed Money Fund, ORNL.

### **Professional Experiences:**

- 2001–now: Research Associate / Staff Scientist, Environmental Sciences Division, Oak Ridge National Laboratory, Oak Ridge, TN.
- 1998–2001: Research Associate, Department of Chemistry, University of Pittsburgh, Pittsburgh, PA.
- 1995–1998: Research Associate, Department of Chemistry, Ben-Gurion University of Negev, Israel.
- 1993–1995: Postdoctoral Fellow / Associate Professor, Institute of Marine Chemistry, Ocean University of China, Qingdao.
- 1987–1993: Research Assistant, Changchun Institute of Applied Chemistry, Chinese Academy of Sciences.
- 1983-1987: Assistant Lecturer / Lecturer, Department of Chemistry, Zaozhuang University, China.

### **Instrumentation Skills:**

- Neutron and X-ray (SANS, SAXS, neutron reflectometry,)
- Spectroscopy (Raman, FTIR, fluorescence, UV-visible, DLS)
- Microscopy (TEM, SEM, AFM)
- Calorimetry (DSC, TGA)

## Professional Affiliations and Activities:

- Member of American Chemical Society
- Member of American Physical Society
- Member of Chinese Chemical Society
- Member of Neutron Scattering Society of America
- Member of Sigma Xi, The Scientific Research Society
- Technical reviewer for American Chemical Society and other international scientific journals, including:
  - ACS Book Series
  - Chemical Letters
  - Chemosphere
  - Inorganica Chimica Acta
  - Journal of Applied Polymer Science
  - Journal of Crystal Growth
  - Journal of Nanoscience and Nanotechnology
  - Materials Chemistry and Physics
  - Nanotechnology
  - Spectroscopy Letters
  - Advanced Materials
  - Chemistry of Materials
  - Colloids and Surfaces A
  - Journal of American Chemical Society
  - Journal of Colloid & Interface Sciences
  - Journal of Physical Chemistry B
  - Langmuir
  - Materials Research Bulletin
  - Physica E
  -

## Selected Publications (form >50 peer-reviewed papers and book chapters):

1. **Wang W.**; Ruan, C.; Gu, B. Synthesis of gold-silica composite nanoparticle substrates for SERS detection of perchlorate in water, *Anal. Chim. Acta* **2006**, 567 (1), 121-126.
2. Ruan, C.; **Wang, W.**; Gu, B. Rapid and ultra-sensitive detection of alkaline phosphatase based on surface enhanced Raman scattering, *Anal. Chem.* **2006**, 78 (10), 3379-3384.
3. Ruan, C.; **Wang, W.**; Gu, B. Surface-enhanced Raman scattering for perchlorate detection using cystamine-modified gold nanoparticles, *Anal. Chim. Acta* **2006**, 567 (1), 114-120.
4. **Wang, W.**; Gu, B. Self-assembly of two- and three-Dimensional particle arrays by manipulating hydrophobicity of silica nanoparticles, *J. Phys. Chem. B* **2005**, 109 (47), 22175-22180.
5. **Wang, W.**; Gu, B. New SERS substrates via self-assembly of silver nanoparticles for perchlorate detection in water, *Appl. Spectros.* **2005**, 59 (12), 1509-1515.
6. **Wang, W.**; Gu, B.; Liang, L.; Hamilton, W. A.; Wesolowski, D. J. Synthesis of rutile ( $\alpha$ -TiO<sub>2</sub>) nanocrystals with highly controlled size and shape by low temperature hydrolysis: effects of solvent composition, *J. Phys. Chem. B* **2004**, 108 (39), 14789-14792.
7. **Wang, W.**; Gu, B.; Liang, L.; Hamilton, W. A. Adsorption and structural arrangement of cetyltrimethylammonium cations at the silica nanoparticle-water interface, *J. Phys. Chem. B* **2004**, 108 (45), 17477-17483.
8. **Wang, W.**; Gu, B.; Liang, L.; Effect of surfactants on the formation, morphology and surface property of synthesized SiO<sub>2</sub> nanoparticles, *J. Disper. Sci. Technol.* **2004**, 25(5), 595-603.
9. Gu, B.; Tio, J.; **Wang, W.**; Ku, Y. -K.; Dai, S. Raman spectroscopic detection for perchlorate at low concentration, *Appl. Spectros.* **2004**, 58(6), 741-744.
10. **Wang, W.**, Gu, B. Preparation and characterization of silver colloids at high concentrations, in *Concentrated Dispersions: Theory, Experiments, and Applications (ACS series No. 878)*, P. Somasundaran and B. Markovic, Eds. Chapter 1, pp.1-15, Oxford Univ. Press, New York, NY, **2004**.
11. **Wang, W.**; Gu, B.; Liang, L. Y.; Hamilton, W. Fabrication of two- and three-dimensional silica nanocolloidal particle arrays, *J. Phys. Chem. B* **2003**, 107 (15), 3400-3404.
12. **Wang, W.**; Gu, B.; Liang, L. Y.; Hamilton, W. Fabrication of near infrared photonic crystals using highly-monodispersed submicrometer SiO<sub>2</sub> spheres, *J. Phys. Chem. B* **2003**, 107, 12113-12117.
13. **Wang, W.**; Asher, S. A. Photochemical incorporation of silver quantum dots in monodisperse silica colloids for photonic crystal applications, *J. Am. Chem. Soc.* **2001**, 123 (50), 12528-12535.
14. **Wang, W.**; Chen, X.; Efrima, S. Fabrication of semiconductor nanoparticles in a three-dimensional organic-layered solid crystal, *Chem. Mater.* **1999**, 11 (7), 1883-1889.
15. **Wang, W.**; Efrima, S.; Regev, O. Directing silver nanoparticles into colloid-surfactant lyotropic lamellar systems, *J. Phys. Chem. B* **1999**, 103 (27), 5613-5621.
16. **Wang, W.**; Chen, X.; Efrima, S. Silver nanoparticles capped by long-chain unsaturated carboxylates, *J. Phys. Chem. B* **1999**, 103 (34), 7238-7246.

17. **Wang, W.**; Efrima, S.; Regev, O. Directing oleate stabilized nanosized silver colloids into organic phases, *Langmuir* **1998**, 14 (3), 602-610.
18. Zhang, Z.; **Wang, W.**; Liu, L.; Fu, Y.; Wu, Z. Studies of ternary surface complexes at liquid-solid interfaces in seawater. III. Comparative studies of the E(%) -pH curves and the diffuse reflectance IR spectra of  $\alpha$ -FeOOH-Cu(II)-amino acid system, *J. Colloid Interface Sci.* **1997**, 190 (1), 1-6.

#### Recent Conference Presentations:

1. **Wei Wang**, Baohua Gu, Incorporating chalcogenide (CdS, ZnS, PbS and Ag<sub>2</sub>S) nanocrystals into silica nanospheres for photonic crystal applications. (*231<sup>st</sup> ACS National Meeting*, Atlanta, GA, March **2006**.)
2. **Wei Wang**, Baohua Gu, Development of fluorescence and Raman-labeled silica nanoparticles for biological applications. (*227<sup>th</sup> ACS National Meeting*, Anaheim, CA, March **2004**.)
3. **Wei Wang**, Baohua Gu, Liyuan Liang, William A. Hamilton, Paul D. Butler, Lionel Porcar, Small angle neutron scattering and dynamic light scattering studies of organic counterion adsorption and distribution at the silica nanoparticle-water interface. (*227<sup>th</sup> ACS National Meeting*, Anaheim, CA, March **2004**.)
4. **Wei Wang**, Lionel Porcar, Paul D. Butler, William A. Hamilton, Liyuan Liang, Baohua Gu, Highly monodispersed silica nanoparticles: controlled formation and EDL characterization by SANS. (*American Conference on Neutron Scattering*, College Park, MD, June **2004**.)
5. **Wei Wang**, Silica-coated metals and semiconductors - From monolayers to photonic crystals. (*Particles 2004*, Orlando, FL, March **2004**.)
6. **Wei Wang**, Baohua Gu, Liyuan Liang, William Hamilton, Preparation and surface modification of monodisperse submicrometer SiO<sub>2</sub> spheres for near infrared photonic crystals. (*225<sup>th</sup> ACS National Meeting*, New Orleans, LA, March **2003**.)
7. **Wei Wang**, Baohua Gu, Fabrication of two-dimensional arrays of SiO<sub>2</sub>, TiO<sub>2</sub> and ZrO<sub>2</sub> nanoparticles. (*225<sup>th</sup> ACS National Meeting*, New Orleans, LA, March **2003**.)
8. **Wei Wang**, Baohua Gu, Liyuan Liang, William Hamilton, Adsorption and structural arrangement of cetyltrimethylammonium surfactant at silica nanoparticle-water interface. (*77<sup>th</sup> ACS Colloid and Surface Science Symposium*, Atlanta, GA, June **2003**.)
9. **Wei Wang**, Baohua Gu, Liyuan Liang, William Hamilton, Counterion adsorption and distribution on charged silica nanoparticle surfaces. (*77<sup>th</sup> ACS Colloid and Surface Science Symposium*, Atlanta, GA, June **2003**.)
10. **Wei Wang**, Alternatively hydrophilic metal nanoparticle and hydrophobic magnetic nanoparticle arrays formed in surfactant lyotropic lamellar phases. (*224<sup>th</sup> ACS National Meeting*, Boston, MA, August **2002**.)
11. **Wei Wang**, Fabrication of tin sulfide nanoparticle arrays within organic-layered solid crystal of bis(alkylammonium) hexachlorostannates(IV). (*224<sup>th</sup> ACS National Meeting*, Boston, MA, August **2002**.)
12. **Wei Wang**, Sanford A. Asher, Silica-void-metal composite nanospheres for nanoreactor and nanocontainer. (*223<sup>rd</sup> ACS National Meeting*, Orlando, FL, April **2002**.)
13. **Wei Wang**, Baohua Gu, William Hamilton, David Wesolowski, Liyuan Liang, Effects of solvent and surfactant on the formation and morphology of TiO<sub>2</sub> nanoparticles by thermal hydrolysis of TiCl<sub>4</sub> in acidic alcohol/aqueous media. (*223<sup>rd</sup> ACS National Meeting*, Orlando, FL, April **2002**.)
14. **Wei Wang**, Liyuan Liang, William Hamilton, Paul Butler, Baohua Gu, Structure and distribution of a cationic surfactant at silica nanoparticle-water interface. (*223<sup>rd</sup> ACS National Meeting*, Orlando, FL, April **2002**.)
15. **Wei Wang**, Baohua Gu, Preparation and characterization of high-concentration monodisperse silver colloids. (*223<sup>rd</sup> ACS National Meeting*, Orlando, FL, April **2002**.)
16. **Wei Wang**, Sanford A. Asher, Photochemical incorporation of silver quantum dots within monodisperse silica colloid for photonic crystal application. (*75<sup>th</sup> Colloid & Surface Science Symposium*, Pittsburgh, PA, June **2001**.)