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**Research Summary:**

- Design and synthesis of hybrid nanostructures with multiple functionalities and increased complexity
- Development of in-situ synchrotron x-ray techniques for non-invasive probing reaction kinetics involved in the synthesis of colloidal nanoparticles in real time
- Investigation of novel properties of the synthesized nanostructures in the context of nanophotonics, photocatalysis, sensing, and energy storage/conversion (e.g., lithium-air batteries)

**Awards:**

- Top 100 Materials Scientists with highest impact score (2000-2010), Rank #5, Thomson Reuters, 11/2011
- Top 100 Chemists with highest impact score (2000-2010), Rank #62, Thomson Reuters, 2/2011
- DOE's Office of Science Early Career Scientist and Engineer Award, 2008
- Presidential Early Career Awards for Scientists and Engineers (PECASE), 2007

**Selected Recent Publications:**

- "A Generic Approach for the Synthesis of Dimer Nanoclusters and Asymmetric Nanoassemblies", Hu, Y.; Sun, Y., J. Am. Chem. Soc., in press.
- "Controlled Synthesis of Colloidal Silver Nanoparticles in Organic Solutions: Empirical Rules for Nucleation Engineering", Sun, Y., Chem. Soc. Rev. DOI: 10.1039/c2cs35289c.
- "Thermal Transformation of  $\delta$ -MnO<sub>2</sub> Nanoflowers Studied by In-Situ TEM", Sun, Y.; Liu, Y.; Truong, T. T.; Ren, Y., Sci. China Chem. 2012, 55, 2346-2352.
- "Morphological and Crystalline Evolution of Nanostructured MnO<sub>2</sub> and Their Application in Lithium-Air Batteries", Truong, T. T.; Liu, Y.; Ren, Y.; Trahey, L.; Sun, Y., ACS Nano 2012, 6, 8067-8077.
- "Stable Magnetic Hot Spots for Simultaneous Concentration and Ultrasensitive SERS Detection of Solution Analytes", Hu, Y.; Sun, Y., J. Phys. Chem. C 2012, 116, 13329-13335.
- "Real-Time Probing of the Synthesis of Colloidal Silver Nanocubes with Time-Resolved High-Energy Synchrotron X-Ray Diffraction", Peng, S.; Okasinski, J. S.; Almer, J. D.; Ren, Y.; Wang, L.; Yang, W.; Sun, Y., J. Phys. Chem. C 2012, 116, 11842-11847.
- "Watching Nanoparticle Kinetics in Liquid", Sun, Y., Materials Today 2012, 15, 140-147.
- "Ambient-Stable Tetragonal Phase in Silver Nanostructures", Sun, Y.; Ren, Y.; Liu, Y.; Wen, J.; Okasinski, J. S.; Miller, D., J. Nat. Commun. 2012, 3, 971.

- “Plasmon Propagation in Chemically Synthesized Gold and Silver Nanowires”, Wild, B.; Cao, L.; Sun, Y.; Khanal, B. P.; Zubarev, E.; Gray, S. K.; Scherer, N. F.; Pelton, M., ACS Nano 2012, 6, 472.
- “Graphene Formed on SiC under Various Environments: Comparison of Si-Face and C-Face”, Srivastava, N.; He, G.; Luxmi; Mende, P. C.; Feenstra, R. M.; Sun, Y., J. Phys. D: Appl. Phys. 2012, 45, 154001.
- “Monitoring of Galvanic Replacement Reaction between Silver Nanowires and H<sub>2</sub>AuCl<sub>4</sub> by In-Situ Transmission X-Ray Microscopy”, Sun, Y.; Wang, Y., Nano Lett. 2011, 11, 4386-4392.
- “Single-Crystal Silicon Membranes with High Lithium Conductivity and Application in Lithium-Air Batteries”, Truong, T. T.; Qin, Y.; Ren, Y.; Chen, Z.; Chan, M. K.; Greeley, J. P.; Amine, K.; Sun, Y., Adv. Mater. 2011, 23, 4947-4952.
- “Surface Chemistry: A Non-negligible Parameter in Determining Optical Properties of Small Colloidal Metal Nanoparticles”, Sun, Y.; Gray, S. K.; Peng, S., Phys. Chem. Chem. Phys. 2011, 13, 11814-11826.
- “Ripening of Bimodally Distributed AgCl Nanoparticles”, Peng, S.; Sun, Y., J. Mater. Chem. 2011, 21, 11644-11650.
- “Growth of Silver Nanowires on GaAs Wafers”, Sun, Y., Nanoscale, 2011, 3, 2247-2255.
- “Plasmonic-Magnetic Bifunctional Nanoparticles”, Peng, S.; Lei, C.; Ren, Y.; Cook, R. E.; Sun, Y., Angew. Chem. Int. Ed. 2011, 50, 3158-3163.
- “Multiple-Step Phase Transformation in Silver Nanoplates under High Pressure”, Sun, Y.; Yang, W.; Ren, Y.; Wang, L.; Lie, C., Small 2011, 7, 606-611.
- “Shaped Gold and Silver Nanoparticles”, Sun, Y.; An, C., Front. Mater. Sci., 2011, 5, 1-24.
- “Synthesis of Silver Nanocubes in a Hydrophobic Binary Organic Solvent”, Peng, S.; Sun, Y., Chem. Mater. 2010, 22, 6272-6279.
- “Nanophase Evolution at Semiconductor/Electrolyte Interface in situ Probed by Time-Resolved High-Energy Synchrotron X-Ray Diffraction”, Sun, Y.; Ren, Y.; Haefner, D. R.; Almer, J. D.; Wang, L.; Yang, W.; Truong, T. T., Nano Lett. 2010, 10, 3747-3753.
- “Reversing the Size-Dependence of Surface Plasmon Resonances”, Peng, S.; McMahon, J. M.; Schatz, G. C.; Gray, S. K.; Sun, Y., Proc. Natl. Acad. Sci. USA, 2010, 107, 14530-14534.
- “Silver Nanowires – Unique Templates for Functional Nanostructures”, Sun, Y., Nanoscale, 2010, 2, 1626-1642.
- “Conversion of Ag Nanowires to AgCl Nanowires Decorated with Au Nanoparticles and Their Photocatalytic Activity”, Sun, Y., J. Phys. Chem. C 2010, 114, 2127-2133.
- “Facile Synthesis of Sunlight-Driven Plasmonic AgCl:Ag Nanophotocatalysts”, An, C.; Peng, S.; Sun, Y., Adv. Mater. 2010, 22, 2570-2574.
- “Imaging of Complex Density in Silver Nanocubes by Coherent X-ray Diffraction”, Harder, R.; Liang, M.; Sun, Y.; Xia, Y.; Robinson, I. K., New J. Phys. 2010, 12, 035019.
- “Nanoscale, Electrified Liquid Jets for High Resolution Printing of Charge”, Park, J.-U.; Lee, S.; Unarunotai, S.; Sun, Y.; Dunham, S.; Song, T.; Ferreira, P. M.; Alleyne, A. G.; Paik, U.; Rogers, J. A., Nano Lett., 2010, 10, 584-591.
- “Synthesis of Ag Nanoplates on GaAs Wafers: Evidence for Growth Mechanism”, Sun, Y., J. Phys. Chem. C 2010, 114, 857-863.
- “Tailored Synthesis of Superparamagnetic Gold Nanoshells with Tunable Optical Properties”, Zhang, Q.; Ge, J.; Goebel, J.; Hu, Y.; Sun, Y.; Yin, Y., Adv. Mater. 2010, 22, 1905-1909.
- “Metal Nanoplates on Semiconductor Substrates”, Sun, Y., Adv. Funct. Mater. 2010, 20, 3646-3657.