Abstract Submitted
for the MAS14 Meeting of
The American Physical Society

Synthesis, characterization and photo-catalytic activity of Au–ZnO heterostructured nano-pyramids OSHADHA RANASINGHA, Department of Physics, West Virginia University, Morgantown, WV 26506 / NETL, U.S. Department of Energy, Pittsburgh, PA 15236, CONGJUN WANG, URS Corporation, South Park, PA 15129 / NETL, U.S. Department of Energy, Pittsburgh, PA 15236, CHRISTOPHER MATRANGA, NETL, U.S. Department of Energy, Pittsburgh, PA 15236, JAMES P. LEWIS, Department of Physics, West Virginia University, Morgantown, WV 26506 / NETL, U.S. Department of Energy, Pittsburgh, PA 15236 — Pyramid shaped ZnO nano crystals were grown on top of spherical shaped Au nanoparticles. The UV-VIS absorption spectra clearly showed 2 clear absorption peaks which correspond to the 1st exciton peak of the ZnO (359 nm) and surface plasmon resonance of the Au nanoparticles (521 nm). The ZnO was 25.9 nm in size in the pure sample and 20.5 nm in the Au-ZnO heterostructures. The Au nanoparticles are around 5-6 nm in Au-ZnO. XRD patterns confirmed the wurtzite hexagonal structure for the ZnO and cubic structure for the Au. According to the High Resolution TEM (HRTEM) images, single crystal ZnO with ZnO (002) lattice fringes can be observed. But Au can be identified as polycrystalline particles with different Au (111) facets. At the interface, there is a lattice expansion in both ZnO (002) and Au (111) planes. Also, XRD Rietveld analysis confirmed a 3 times higher strain in ZnO particles in Au-ZnO compared to the pure ZnO. Methylene blue dye degradation reactions were performed to evaluate the catalytic activity of the Au-ZnO, which showed a very high catalytic activity compared to the pure ZnO.

Oshadha Ranasingha
Department of Physics, West Virginia University

Date submitted: 29 Aug 2014 Electronic form version 1.4