Abstract Submitted
for the NWS09 Meeting of
The American Physical Society

Synthesis and Optical Properties of Zn/ZnO core-shell nanoparticles HUI CHE, YUFENG TIAN, RYAN SOUZA, YOU QIANG, CHONGMIN WANG, ZHEMING WANG, WEILIN JIANG, University of Idaho — Wide band-gap semiconductor ZnO is an important functional material due to its large exciton binding energy and unique optical properties. The structure of ZnO affects the properties. Zn/ZnO core-shell structured nanoparticles are produced in our lab by a sputtering-gas aggregation cluster source and deposited onto a Si substrate. During the aggregation the outer sphere of the nanoparticles is oxidized, giving Zn particles in ZnO shells. Post annealing was performed to some samples in a tube furnace in air. TEM, XRD and photoluminescence (PL) were performed. TEM results show that the size of Zn/ZnO particles can be controlled by adjusting the aggregation length and the flow rate of Ar gas. During post annealing, the particles were totally oxidized into ZnO and become polycrystalline so that the Zn phase can no longer be detected in XRD pattern. PL spectra of as prepared samples show a strong UV emission peak centered at 355nm and two peaks in visible region centered at 445nm (blue) and 530nm (green). Post annealing decreases these emissions. This research is supported by DOE-EPSCoR (DE-FG02-04ER46142) and DOE-BES (DE-FG02-07ER46386). Part of the work was performed at EMSL, a DOE user facility.

Hui Che
University of Idaho

Date submitted: 13 Apr 2009 Electronic form version 1.4