Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

Photoluminescence of Sequential Infiltration Synthesized ZnO nanostructures.[1] LEONIDAS OCOLA, Argonne Natl Lab, DAVID GOSZTOLA, ANGEL YANGUAS-GIL, Argonne National Laboratory, AINE CONNOLLY, Vassar College — We have investigated a variation of atomic layer deposition (ALD), called sequential infiltration synthesis (SiS), as an alternate method to incorporate ZnO and other oxides inside polymethylmethacrylate (PMMA) and other polymers. Energy dispersive spectroscopy (EDS) results show that we synthesize ZnO up to 300 nm inside a PMMA film. Photoluminescence data on a PMMA film shows that we achieve a factor of 400X increase in photoluminescence (PL) intensity when comparing a blank Si sample and a 270 nm thick PMMA film, where both were treated with the same 12 alternating cycles of H2O and diethyl zinc (DEZ). PMMA is a well-known ebeam resist. We can expose and develop patterns useful for photonics or sensing applications first, and then convert them afterwards into a hybrid polymer-oxide material. We show that patterning does indeed affect the photoluminescence signature of native ZnO. We demonstrate we can track the growth of the ZnO inside the PMMA polymer using both photoluminescence and Raman spectroscopy and determine the point in the process where ZnO is first photoluminescent and also at which point ZnO first exhibits long range order in the polymer.

[1]This work was supported by the Department of Energy under Contract No. DE-AC02-06CH11357. Use of the Center for Nanoscale Materials was supported by the U. S. Department of Energy, Office of Basic Energy Sciences, under Contract No. DE-AC02-06CH11357.

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Date submitted: 06 Nov 2015 Electronic form version 1.4