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A Green Hydrothermal Synthesis for Iron-Doped, Carbon-Coated Tellurium Nanostructures and an Analysis of the Effects of the Molecular Weight and Ratio of Poly(vinylpyrrolidone) on Nanostructure Morphology[1] T. MULLIGER, Clemson University, S. MISHRA, The University of Memphis, S. GUHA, University of Missouri — A poly(vinylpyrrolidone) (PVP)-assisted hydrothermal process was used to synthesize tellurium nanostructures, as well as carbon-coated tellurium nanostructures (Te@C) in the presence of glucose as a carbon source. The thickness of ultra-thin tellurium nanostructures in the presence of PVP was found to depend upon the molecular weight of the polymer, as well as the ratio of polymer to tellurium source (Na2TeO3) used as starting materials. Structures ranging from 3-15nm were synthesized using four different molecular weights of PVP polymer (10,000; 29,000; 40,000; and 55,000) as well as different ratios of polymer to sodium tellurite, and their difference are compared. Varying the reaction time of the carbon-coating hydrothermal process yielded carbon-shell thickness ranging 20-60nm. As-prepared Te@C nanostructures were decorated with iron nanoparticles through an ultrasonication process at 0C under a flow of argon. Hollow carbon nanostructures were also synthesized through a mild chemical treatment process at room temperature. Samples were extensively characterized through transmission electron microscopy (TEM), scanning electron microscopy and energy dispersive x-ray analysis (SEM/EDAX), ultraviolet visible, and PL.

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