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Composition Dependent Majority Charge Carriers in Cobalt Iron Sulfide ($Co_xFe_{1-x}S_2$) Pyrite Nanocrystals EBIN BASTOLA, TYLER KINNER, KHAGENDRA BHANDARI, Wright Center for Photovoltaics Innovation and Commercialization, Department of Physics and Astronomy, The University of Toledo, Toledo, Ohio 43606, BRADLEY MONAHAN, Department of Chemistry, The University of Toledo, Toledo, Ohio 43606, NEALE HAUGEN, PAUL ROLAND, Wright Center for Photovoltaics Innovation and Commercialization, Department of Physics and Astronomy, The University of Toledo, Toledo, Ohio 43606, TERRY BIGIONI, Department of Chemistry, The University of Toledo, Toledo, Ohio 43606, RANDY ELLINGSON, Wright Center for Photovoltaics Innovation and Commercialization, Department of Physics and Astronomy, The University of Toledo, Toledo, Ohio 43606 — We report the hot-injection colloidal chemical synthesis, and characterization of cobalt (Co) doped iron pyrite (FeS_2) nanocrystals (NCs). The synthesized alloyed $Co_xFe_{(1-x)}S_2$ pyrite NCs have been characterized by using X-ray diffraction(XRD), scanning electron microscopy (SEM), energy dispersive spectroscopy (EDS), Raman, and UV-Vis-NIR spectroscopy. We discuss the electronic properties such as resistivity, mobility, carriers concentration of the NC thin films. Based on the hot-probe and Hall measurements, the iron pyrite (FeS_2) NC thin films are p-type, and on doping these iron pyrite NCs with Co, the majority charge carriers changes from p-type to n-type in between the Co concentration of 16% to 21%.

Wright Center for Photovoltaics Innovation and Commercialization, Department of Physics and Astronomy, Th

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