Title
Fully tunable InxGa1-xP nanowires via a solution phase synthesis

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INOR 575: Fully tunable In[sub]?x[/sub]?Ga[sub]?1-x[/sub]?P nanowires via a solution phase synthesis

Abstract: III-V semiconductor alloys are uniquely useful for a variety of applications, including biomedical imaging, transistors, and energy conversion. However, their production typically requires complex gas phase instrumentation or high temperature melts which limits their prospects for widespread implementation. Furthermore, the need for lattice matched growth substrates in most synthetic schemes confines the composition range of the synthesized materials. In this work, we present a solution phase synthesis for Indium Gallium Phosphide (InxGa1-xP) alloy nanowires with tunability across the entire composition range without the need for a lattice matched substrate. Our synthetic approach offers both lower temperatures and scalability that is not available with previous growth methods. Furthermore, this is the first example of any fully tunable III-V alloy material system that is synthesized in the solution phase. The alloy nanowires were characterized via optical (UV-Vis-NIR absorbance, photoluminescence), structural (powder X-ray diffraction), and spectroscopic (electron energy loss spectroscopy, time-resolved photoluminescence spectroscopy) methods . To demonstrate one potential function of the alloy nanowires, a series of p-type, zinc doped, nanowires were synthesized and processed into photocathodes for photoelectrochemical water splitting .

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