Intermetallics via Flux Growth: Grounds for Discovery

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Chemistry Seminar on *Flux growth of Intermetallic Compounds*

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Abstract: Intermetallics are attractive due to their wide variety of properties; superconductivity, semiconductivity, topology, magnetism, catalysis, and thermoelectricity, etc. For synthesis, we utilize flux growth which produces naturally faceted crystals. In this talk, I will briefly discuss the discovery of different intermetallics: $SmMnBi_2$, MM'_2Zn_{20} (M, M' = TM/RE), and $Mn_{4-x}Cr_xAl_{11}$. $SmMnBi_2$ is topological semimetal candidate. In topological materials, the bulk is a bad conductor while the surface states are metallic with high mobility. The surface is also topologically protected; basically meaning that impurities have no effect on the conductivity. MM'_2Zn_{20} are thermoelectricity candidates. Thermoelectric materials are appealing due their ability to directly convert between heat and electricity. The main issue is that the physical parameters to determine thermoelectric performance work against one another. For achieving the optimum performance, hindering lattice vibration by forming cage structures in which heavy atoms can rattle is a plausible way. $Mn_{4-x}Cr_xAl_{11}$ is a disordered ferrimagnet, where the ferrimagnetism appears after Cr-doping.

About the speaker: Tiglet Besara is an assistant professor in the department of Physics, Astronomy, and Materials Science at Missouri State University since 2018. Prior to that, he was a postdoc focusing on crystal growth and crystallography at the National High Magnetic Field Laboratory, with a short stint as joint postdoc between NHMFL and Columbia University. His earned his PhD in Chemical Physics in 2011 at Florida State University, with research conducted at NHMFL focusing on condensed-matter NMR to study metal-organic frameworks. Before coming to the United States, he earned a MPh in Physics with a thesis in theoretical neutrino physics at Stockholm University. His research focuses on the discovery of new inorganic materials and their characterization.