# Boron: Enabling Metal-rich Structures and Rare-Earth-Free Magnetic Materials

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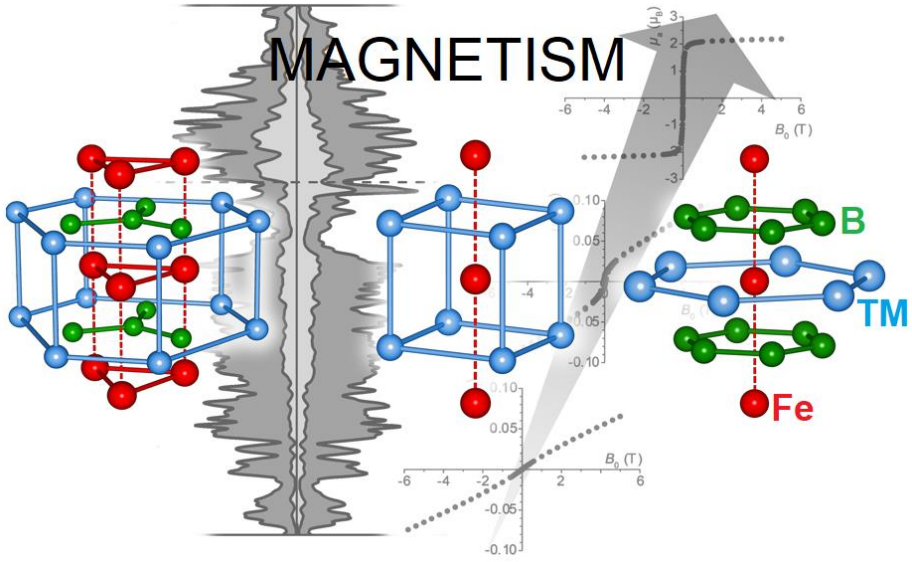
Boron tends, like carbon and silicon, to form covalent molecular as well as extended compounds, but boron's "electron deficiency" enables the formation of multicenter B–B bonds, and therefore unexpected compounds. Boron reacts with most metals to form the large class of metal borides, ranging from the boron-richest $YB_{66}$ monochromator up to the metal-richest $Nd_{14}Fe_2B$ permanent magnet. This huge composition range, coupled with the unusual chemical bonding, makes this class of materials an ideal playground for unexpected discoveries. In this seminar, I will present our recent works on "designing" new materials [1-5], all of which contain boron and show Curie temperatures as high as 850 K. I will show that boron does not only help build new crystal structures but it also plays a prominent role on the studied properties. Furthermore, I will present a new reaction developed recently that enables the synthesis of these materials at the nanoscale, a major step toward fulfilling their huge potential [6].

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**Biography:**

Boniface P. T. Fokwa obtained his BS and MS from University of Yaounde I (Cameroon), his PhD from Dresden University of Technology (Germany) in 2003 and his Habilitation from RWTH Aachen University (Germany) in 2010. After working for four and half years as Heisenberg Fellow at RWTH he accepted an assistant Professor position at University of California, Riverside in 2015. He was a visiting scientist at the University of Auckland (New Zealand, 2011), at Cornell University (USA, 2012) and a visiting Professor at the University of California, Los Angeles (USA, 2014-2015). He was awarded an NSF CAREER in 2016 and promoted to Associate Professor in 2018. He serves as Section Editor for Encyclopedia of Inorganic and Bioinorganic Chemistry. His research group combines experimental and computational methods to rationally design materials for energy-related applications such as magnets, superconductors and catalysts.
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