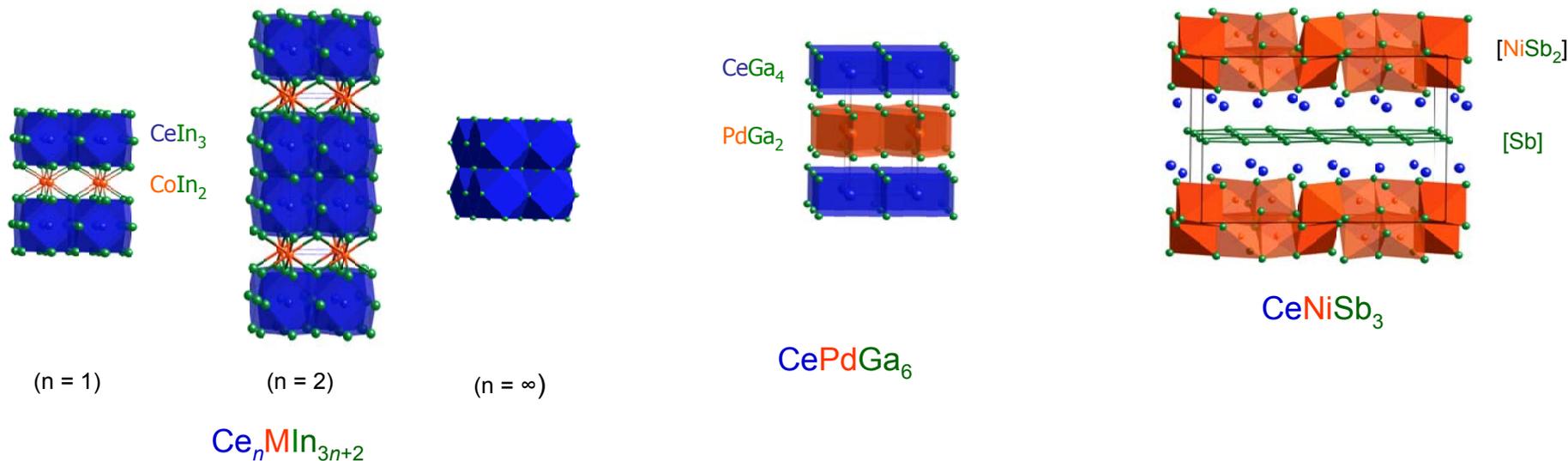


Crystal-Chemical Relationships of Correlated Electronic Materials

Julia Y. Chan

DMR-0237664

The details of a single crystal structure can provide deep insights into the relationship between structure and electronic properties which can make a substantial impact on technology. This has been illustrated for the structure-sensitive physical properties such as superconductivity and magnetism. My research program is aimed at the exploration of the rewarding boundary between crystallography and the systematic study of structure-dependent properties such as superconductivity and magnetism in rare earth intermetallics. Shown below are 3 new families of heavy fermions exhibiting magnetic ordering and/ or superconductivity



Macaluso, R. T. et. al, "Single-Crystal growth of Ln_2MIn_8 ($\text{Ln} = \text{La}, \text{Ce}$; $\text{M} = \text{Rh}, \text{Ir}$): Implications for the heavy-fermion ground state", *Chem. Mater.* **2003**, *15*, 1394.

Macaluso, R. T. et. al "Synthesis, structure, and magnetism of a new heavy-fermion, CePdGa_6 ", *J. Solid State Chem.* **2003**, *174*, 296.

Macaluso, R. T. et al., "Structure and transport properties of CeNiSb_3 ", *J. Solid State Chem.* In Press, **2003**.

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Education:



PI showing students high temperature synthesis (above) and undergraduates the packing of solids (below) in front of an X-ray Diffractometer.



Outreach:

Shawn Liner, a high school teacher spent his summer putting together materials science demonstrations for future LSU students. Demonstrations include superconductivity, smart metal alloys¹ and ferrofluids.² Undergraduates and graduate students from the group perform experiments to K-12 students every semester.



Nitinol Braces

<http://www.cnn.com/HEALTH/9811/02/space.medical/>



Ferrofluids

<http://www.technorama.ch/ausstellung/magnetismus.html>

Graduate Students:

Robin Macaluso, Erick Lawson, Willa Williams, Evan Thomas, Jasmine Millican (3 Female, 4 African Americans)

Undergraduates: Andrew Bankston, Erin Erickson, Nathan Henderson