**Origin of High Thermoelectric performance in n- and p-type SnSe crystals**

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Tin selenide (SnSe) has emerged as a very promising thermoelectric material due to its record high figure of merit ZT for both n- and p-type crystals in mediate temperature range. In this talk, I will present our recent works regarding its electronic and thermal properties based on first-principles calculations, in combination with the Boltzman transport theory and experimental measurements. The origins of strongly anisotropic thermal and electrical behaviors in this layered lattice structure will be discussed, which give rise to the highest optimal ZT values along the a axis (out-of plane direction) in the n-type SnSe, whereas along b axis in p-type materials. In addition, I will discuss the effects of the intrinsic defects and dopants on its thermoelectric characteristics. Our calculations show reasonable agreements with the experimental observations and provide some guidance for optimizing the thermoelectric performance.