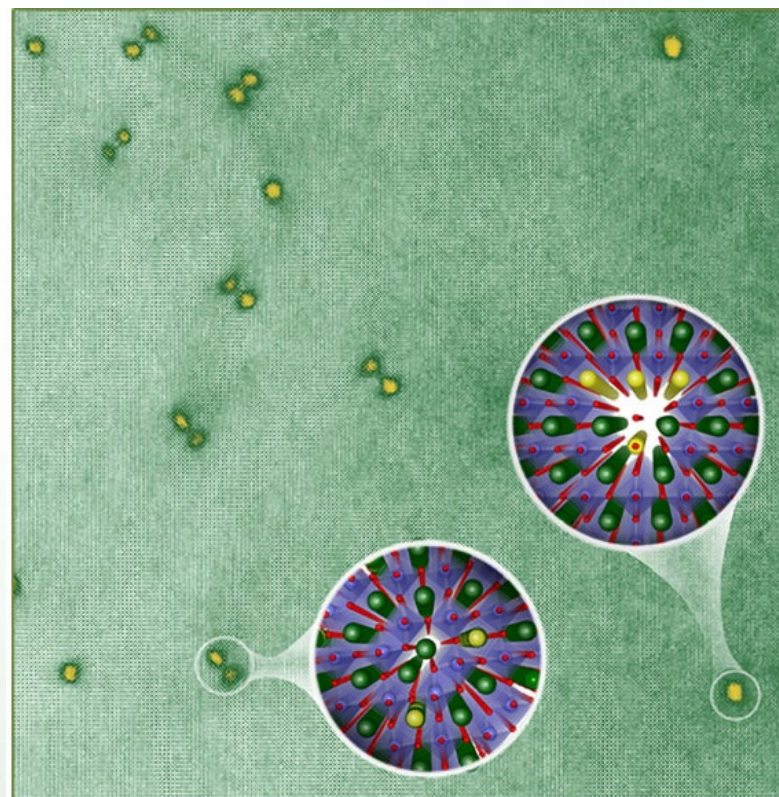


## Intellectual Merit

Emerging semiconductors such as tin-based oxides have enormous application potential in devices, as they are transparent, support highly mobile electrons, and have wide “energy gaps”. Unlike better developed semiconductors, however, these materials are prone to harboring defects, which can limit essential properties such as electron mobility. In this work, University of Minnesota MRSEC researchers achieved the first detailed understanding of the interactions between the most important defects in these materials: deliberately-introduced “dopant” atoms, and naturally-forming “dislocations” (essentially extra chains of atoms). The dislocations were found to profoundly impact dopant atom locations, the formation of additional defects, and the electronic properties of the semiconductor, in unexpected ways. These results will now inform future studies to further refine the electronic properties of these exciting new materials.



- H. Yun, A. Prakash, T. Birol, B. Jalan and K.A. Mkhoyan, *Nano Lett.* **21**, 4357-4364 (2021)