

Three-dimensional metal oxide crystals with complex structures or compositions are challenging to prepare because it is difficult to control nanoscale phenomena underlying crystal nucleation and growth. Researchers at the Wisconsin MRSEC have now made important steps in establishing this control in so-called “perovskite” complex oxide crystals, a class of materials with useful optical and electronic properties.

The team achieved this advance by templating growth of oxide crystals from an amorphous starting material, a process termed solid-phase epitaxy (SPE). Their work reveals that nanocrystals of the oxide  $\text{SrTiO}_3$  (STO) can be used to select the location at which STO crystals formed and grow. The discovery expands the resulting crystal sizes from the nanometer range of previous thin-film studies to the micrometer scale, and shows that relative rates of crystallization and nucleation are favorable for forming a range of 3D oxide structures.

