MIP: PARADIM at Cornell University, DMR-2039380

User Collaboration - 2022

X-ray micro-computed tomography informs materials discovery

John T. Heron (U. of Michigan) and Tyrel M. McQueen (JHU)

X-ray micro-computed tomography (μCT) uses high-energy X-rays to non-destructively generate 3D representations of a material with micron/nanometer precision, taking advantage of various contrast mechanisms to enable the quantification of the types and number of inhomogeneities.

Here, **members of PARADIM's in-house research team collaborated with external users and summer school participants** on case studies of μCT informing materials design of electronic and quantum materials, benefitting the characterization of inclusions, twinning, and low-angle grain boundaries and optimizing crystal growth processes. The work discusses recent improvements in μCT instrumentation that enable elemental analysis and orientation to be obtained on crystalline samples, for example the PARADIM User-pioneered electronic materials rutile germanium dioxide (GeO_2, depicted here).

The benefits of μCT as a non-destructive tool to analyze bulk samples should encourage the community to adapt this technology into everyday use for electronic and quantum materials discovery.

L.A. Pressley, *et al.* *npj Quantum Materials* **7**, 121 (2022).

Associated data: 10.34863/sd37-3694.