Nanomolding of metastable Mo_4P_3

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Compared to their natural bulk form, many materials show emergent phenomena and properties when confined to lower dimensions. Nanowires have been of particular interest to realize topological superconductors or topological surface states for low dissipation microelectronics.

A new fabrication technique to study the vast number of predicted quantum materials is nanomolding, where polycrystalline feedstock material is pressed into a nanoporous mold at elevated temperatures and high pressure. A process that results in single crystalline, defect-free nanowires that can be released from the mold.

Here, an **external (now local) group of researchers came to PARADIM's Electron Microscopy as well as Theory Facilities** to characterize nanomolded molybdenum-phosphide nanowires. Using a poly-crystalline feedstock of MoP, the achieved nanowires are of the composition Mo_4P_3, a phase metastable at room temperature and ambient pressures, demonstrating a new pathway to the nanofabrication of metastable phases. Density functional theory band structure calculations and resistivity measurements indicate that Mo_4P_3 is a non-topological metal with resistivity values comparable to other molybdenum phosphide compounds.

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