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## Nanolamellar Materials and Their 2D Derivatives: A Playground for Materials Design

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Inherently and artificially layered materials in 2D and 3D are in the focus in both, science and technology. The family of MAX phases, where M stands for a transition metal, A for an A-group element and X for Carbon or Nitrogen, offers an exciting playground for property design. MAX phases are hexagonal compounds and combine some of the best attributes of metals and ceramics being excellent thermal and electric conductors, damage and thermal shock tolerant and oxidation resistant. Since 2013 – when the first magnetic MAX phase has been reported – theoretical and experimental studies explore their magnetism. We epitaxially grow MAX phase films (see micrograph) by pulsed laser deposition and study the correlation of structure and magnetism within CRC/TRR 270. Moreover, when A layers are selectively removed from those nanolamellar crystals, a 2D material is formed, called MXene. Since their discovery in 2011, MXenes rapidly established as a novel class of 2D materials with remarkable possibilities e.g. in energy storage, as transparent electrodes, as sensors, or in EMI and rf-shielding.

In the talk, I invite you on a journey from 3D to 2D materials and back.