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Real Space Imaging of Structurally and Compositionally Complex Materials

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High-Angle-Annular Dark-Field Scanning Transmission Electron Microscopy (HAADF/STEM) is a technique uniquely suited for detailed studies of the structure and composition of complex materials and allows us to speed up structural investigations in comparison to powder diffraction. The Mo-V-Nb-(Sb,Te)-O system has been identified as a commercially viable catalysts for the selective oxidation and ammoxidation of small alkanes to make about 25tly advanced the complexity of frozen-phonon calculations now possible to simulate HAADF-STEM images using massively parallel computations. In-situ heating in a STEM has revealed very unique thermal behavior and imaging at various temperatures helps us understand the operation of these catalysts near operando conditions .