

Abstract Submitted
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Spatial resolution in vibrational-loss electron energy-loss spectroscopy CHRISTIAN DWYER, Arizona State Univ — Arizona State University is home to the first transmission electron microscope in the world that can perform vibrational-loss spectroscopy. This new experimental capability, whereby we distinguish those transmitted electrons that have imparted some of their energy to excite the atomic vibrational modes of the specimen, has sparked significant interest in the underlying scattering physics. In particular, the question of whether or not it is possible to perform vibrational spectroscopy at, or near, atomic spatial resolution is the subject of ongoing debate. Such a capacity would offer substantial advantages in several technologically-important fields, such as catalysis and nanostructured device materials. The experimental data obtained thus far indicates that the vibrational-loss signals contain a significant degree of so-called "inelastic delocalization", which would imply that high spatial resolution is not achievable. Here, we present part of our ongoing theoretical investigations which show that, despite the presence of delocalization, high spatial resolution may be achieved in some circumstances. The relevance for advanced materials characterization and the ongoing experimental efforts at ASU will be discussed.

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