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Title:
Tackling the challenges of novel materials analysis: recent conceptual and technological advances in transmission electron microscopy

Abstract: Nowadays a great host of novel materials is being developed to address the current challenges we face in our society. The interest in applications such as green energy production, CO₂ capturing, catalysis, and advanced electronics has skyrocketed in recent years. However, understanding the functionality of these materials is still challenging and often requires reliable characterization methodology which preserves the material's integrity while its properties are examined. In this context, transmission electron microscopy (TEM) offers a wide range of new capabilities for studying the novel materials at the atomic scale. At Thermo Fisher Scientific we continuously develop innovative solutions, in order to (i) expand the capabilities to wider ranges of information, e.g. magnetic/electrical properties, phononics and plasmonics, chemical composition, and structures at the atomic level, (ii) expand the aforementioned capabilities to a wide range of specimens from robust to highly electron-beam-sensitive, e.g. polymers, zeolites and MOFs, and on the other hand, (iii) avail TEM to a broader group of researchers, by providing fully-integrated easy-to-use reproducible platforms with imbedded automated features. In this contribution, we present the most recent advances aimed at achieving these goals. In particular, we focus on newly developed fully-integrated EELS solutions as well as other concepts and technologies for preserving specimen integrity. These are meant to provide the user-friendly all-in-one TEM platform the scientists need in order to explore the properties of novel materials at their native state.