

# Introduction to Transmission Electron Microscopy

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Scanning Transmission Microscopy (STEM) and its related structural and spectroscopic imaging techniques is a very versatile technique for providing structural, chemical and electronic information from materials at very high spatial resolution. Over the last decade, the development of lens aberration correctors has allowed a real breakthrough towards sub-angstrom resolution. Different types of atomic resolution imaging modes are now available allowing access to the crystallography of materials in real space. These new imaging modes, coupled with new possibilities in spectromicroscopy at the individual atomic column scale, provide particularly relevant information channels for the exploration of physics at strongly correlated oxide interfaces.

In this introductory course, the physical basics of image formation in STEM will be introduced and some different types of image modes and contrasts will be reviewed. As a few applications, we will show, for example, how it is possible to probe the role of structural distortions or to quantify in real space the atomic displacements with a few picometers in nanostructured oxide materials.