**Navigating the Nanoworld**

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Today’s aberration-corrected electron microscopes are changing the way materials science is done. The spectacular advances in recent years are allowing unprecedented information on atomic configurations, atomic species, their charge, bonding and local electric fields. It has become possible to navigate the nanoworld atom by atom, cataloguing defects and explaining macroscopic properties like never before. It is even possible to fabricate entirely new materials using the energy of the electron beam.

In this lecture I will show a number of examples, including how we can watch atomic diffusion within a solid and understand the mechanism, investigate the dynamics of nanoclusters and understand their properties, and how we can actively improve materials properties through understanding and tuning the atomic structure. Finally I will show some possible new directions for future development.