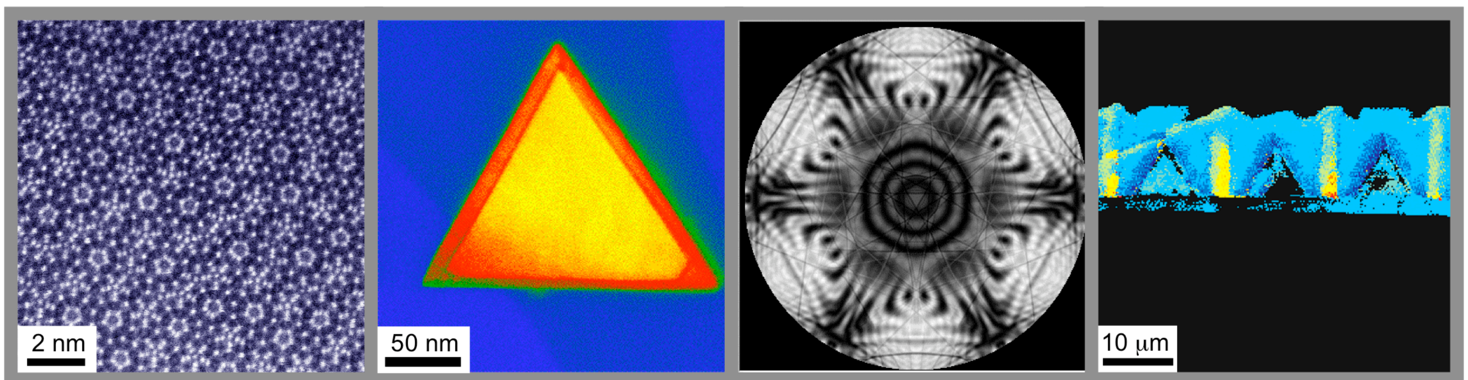
Spring 2008:

3.074/3.34 Imaging of Materials

Instructor: Silvija Gradečak

Did you know that carbon nanotubes might have not been discovered without high-resolution transmission electron microscopy or that single-dopant atoms can be observed using Z-contrast microscopy?



Aberration-corrected dark-field STEM image of a (Al-Cu-Co) quasicrystal*.

False-colored cross-section HAADF STEM image of a GaN/AlGaN core-shell nanowire.

Simulated convergent-beam electron diffraction disk of Si [111]**.

Cathodoluminescence wavelength image of ELO-GaN.

In this course we study principles and applications of imaging techniques for materials characterization including transmission and scanning electron microscopy and scanning probe microscopy. Topics include: electron diffraction; image formation in transmission and scanning electron microscopy; diffraction and phase contrast; imaging of crystals and crystal imperfections; review of the most recent advances in electron microscopy for bio- and nanosciences; analysis of chemical composition and electronic structure at the atomic scale. Lectures are complemented by real-case studies and computer simulations.

Units: 3-0-9
Lecture: TR1-2.30 (2-131)

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* Image courtosy of JEOL.
** http://cimewww.epfl.ch/people/stadelmann/jemswebsite/jems.html