

# **Gain from high resolution Electron energy-loss spectroscopy: Momentum dependent optical properties, charge transfer and bonding environment**

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## **ABSTRACT**

In this presentation I will review recent developments in EELS spectroscopy. I will give an overview in the basic principles as well as in the dielectric response theory.

In a second part I will compare momentum dependent EELS with TEM-EELS, inelastic x-ray scattering and optical absorption spectroscopy highlighting the different response functions.

Then I will describe on selected examples how to probe dimensionality effects as well as the joined density of states in the low energy valence band excitation spectrum utilizing plasmon dispersion relations and the dispersion of interband plasmon excitations.

These examples will cover, simple metals, molecular systems, polymers, graphite and carbon nanotubes.

As a last point I will focus on core level excitation spectra in comparison to x-ray absorption spectroscopy. I will show on these selected examples how to unravel the local bonding environment and charge transfer as well as how to gain information on the site selective density of states of the conduction band.