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# ENERGY FILTERED IMAGING

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In standard transmission electron microscopy the image is formed from the entire range of electron energies transmitted through the sample including those electrons that were scattered elastically (zero-loss) and those electrons that were scattered inelastically (energy loss). In energy filtered imaging the image is formed only by electrons transmitted within a certain energy window. Energy filtered imaging can be used to obtain specific elemental information and also to improve the resolution of the microscope.

## Possible Applications

- elemental distributions in heterogeneous catalysts
- grain boundary segregation in intermetallic alloys
- detection of impurities at ceramic interfaces
- resolution improvement in thick samples (remove plasmon-scattered electrons)

## Limitations

Sample must be thin enough (typically, less than 50-100 nm) to avoid plural inelastic scattering. Background subtraction is required for quantitative distributions.

## Suitable Microscopes

Energy-filtered imaging can be accomplished in two different ways using either an in-column filter or a post-column filter.

## Gatan Imaging Filter (GIF™)

The Gatan imaging filter is a magnetic prism spectrometer which is positioned after the projector lens, spreading the electrons into a spectrum of energies. The GIF is tuned to pass only the desired range of energies through a slit which blocks electrons outside that energy range.

These techniques are available on the Tecnai F20.