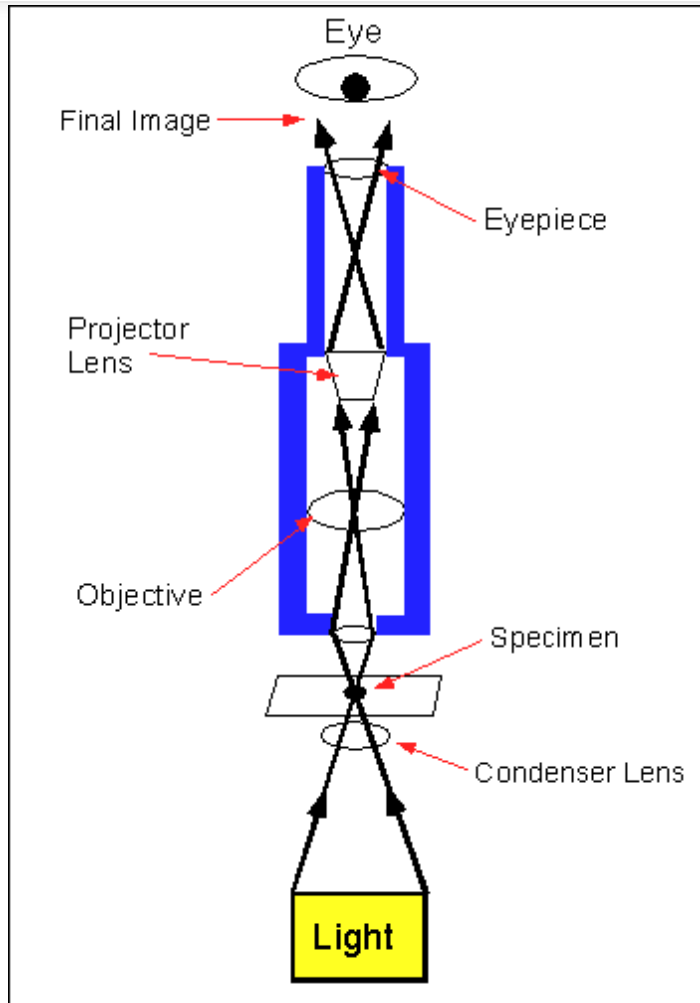


Elemental  
Analysis using  
Energy  
Dispersive  
Spectroscopy

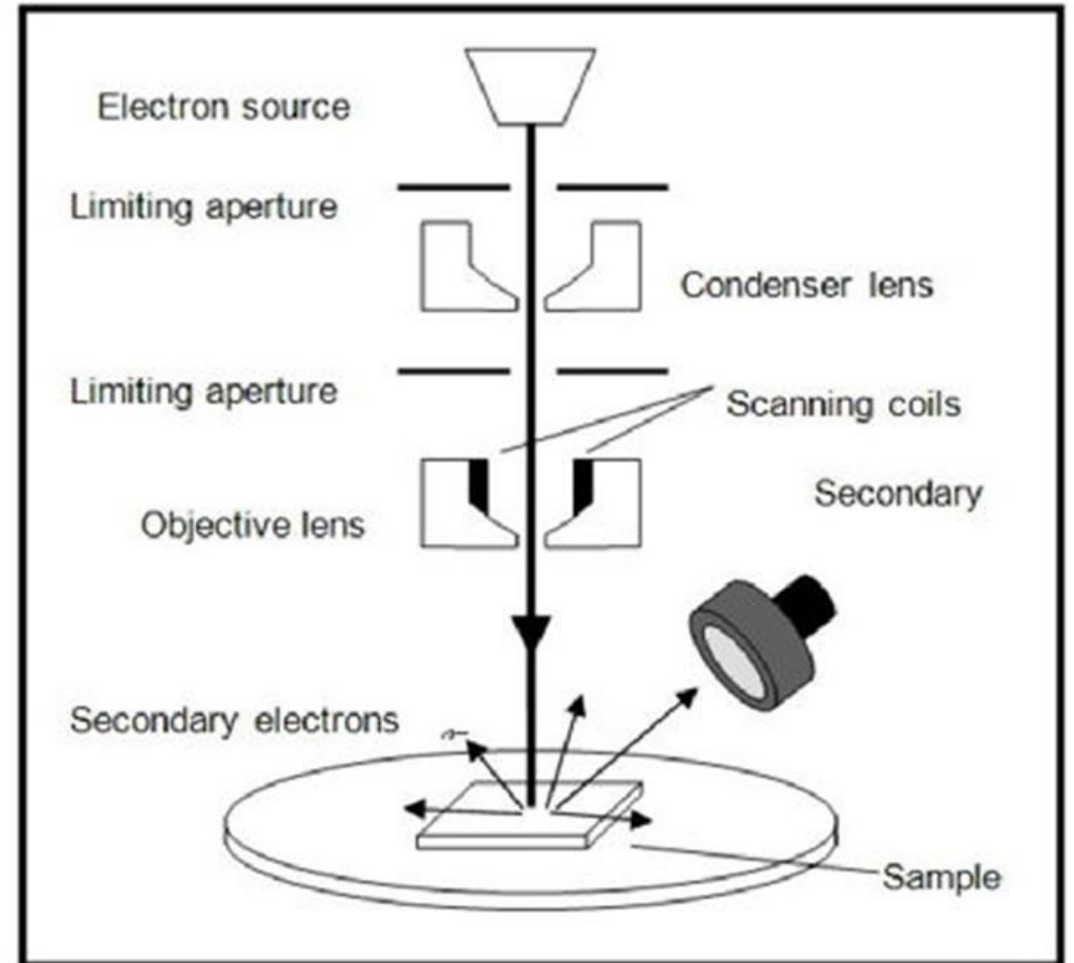
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# Light Microscope

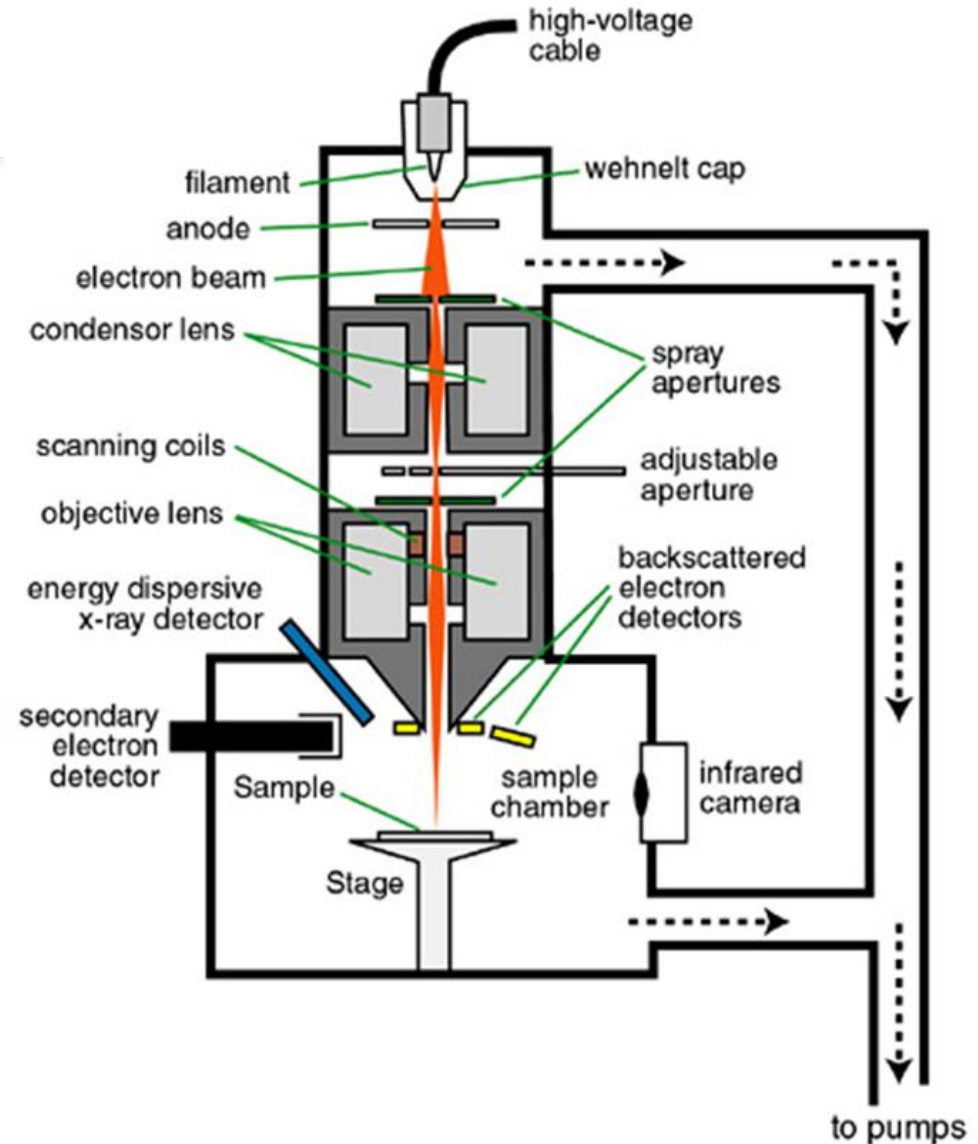


# Scanning Electron Microscope



# How does an SEM work?

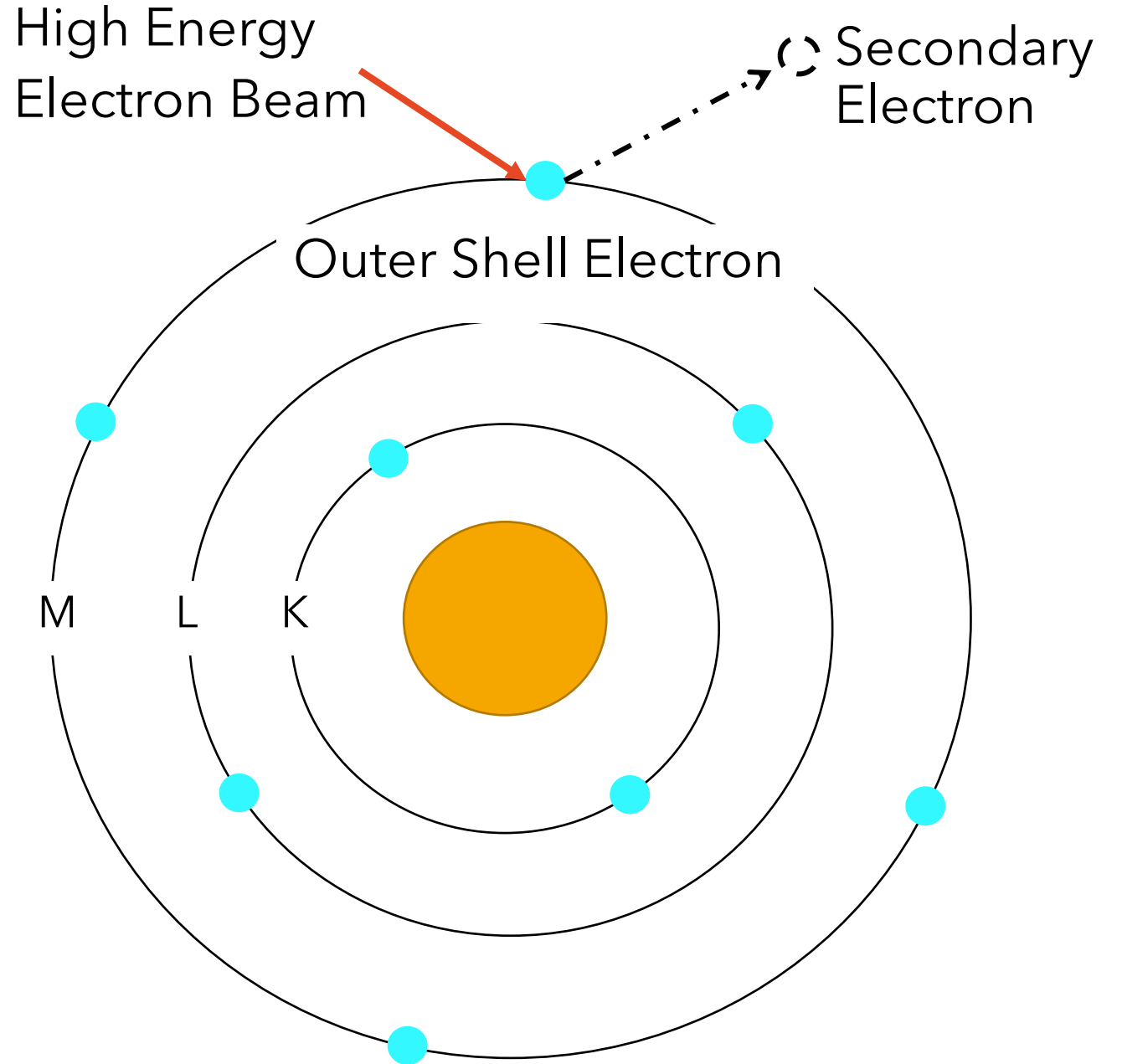
- Electron beam produced at top of SEM.
- The beam is directed down in a vacuum.
- Electromagnetic fields and lenses focus the beam down to the sample.
- When the beam hits the sample, electrons and X-rays are ejected.
- Detectors collect the secondary electrons and X-rays and convert them into a signal.
- The signal is sent to a monitor, which produces the final image.





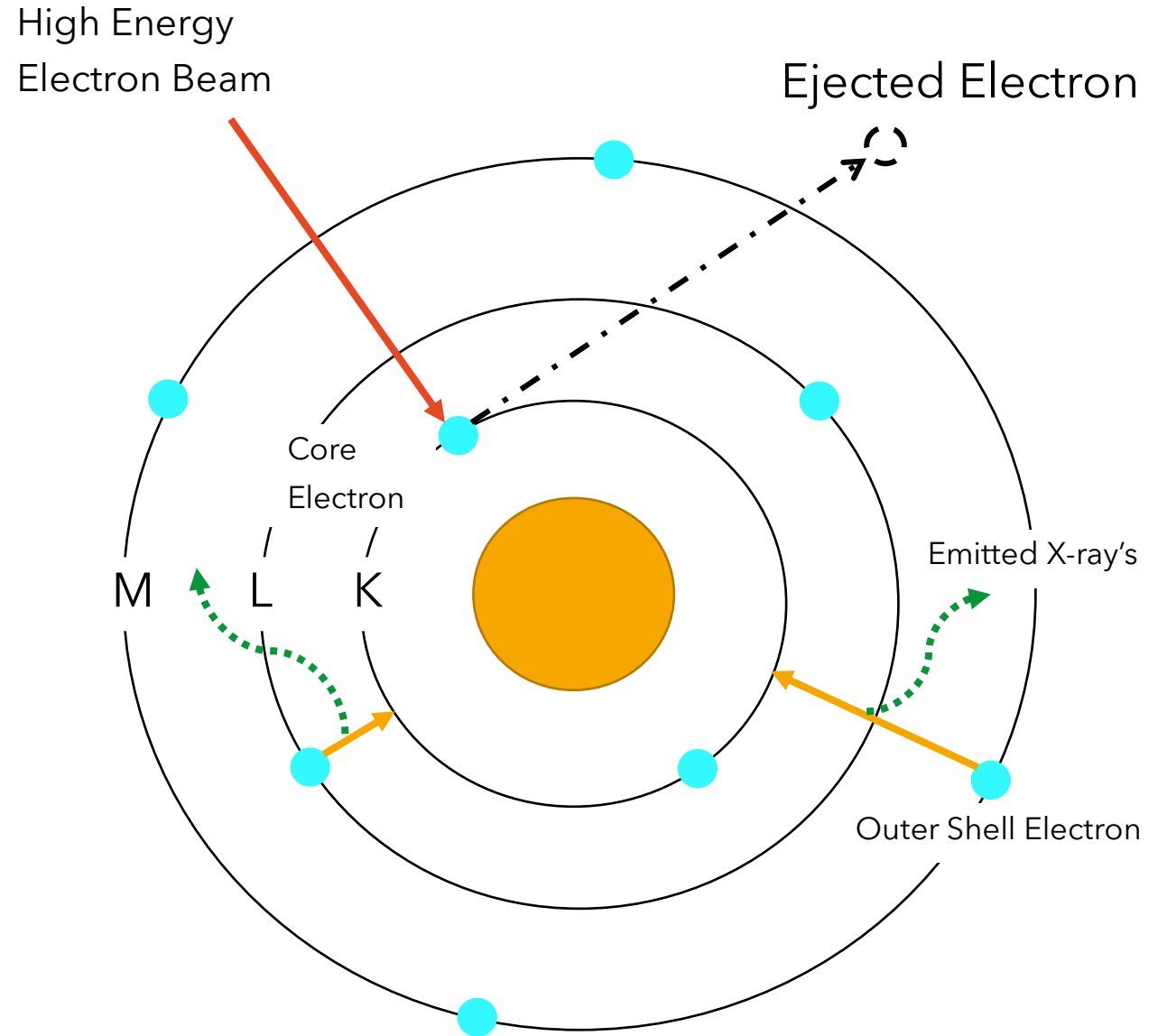
How does the electron beam generate an image?

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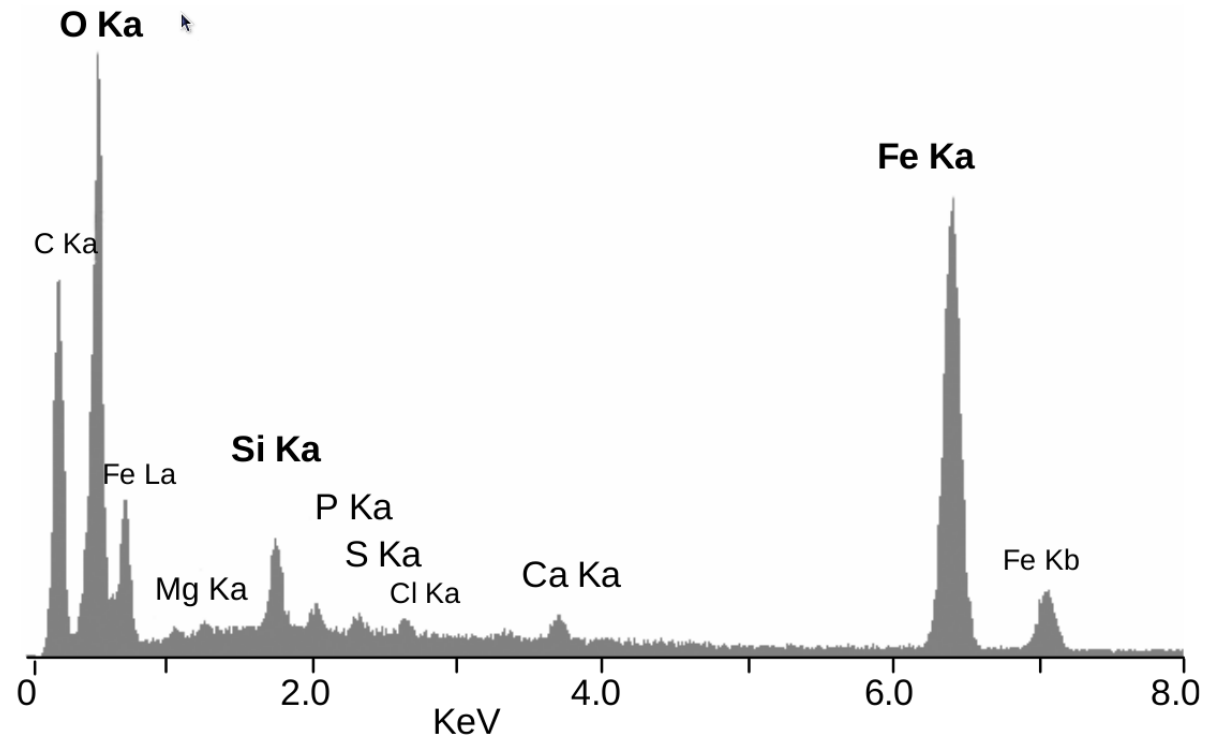
## How do we identify elements using an electron microscope?

- Electron beam at high energy
- Beam ejects core electron, leaving a hole
- High energy electron drops into hole
- Energy is released



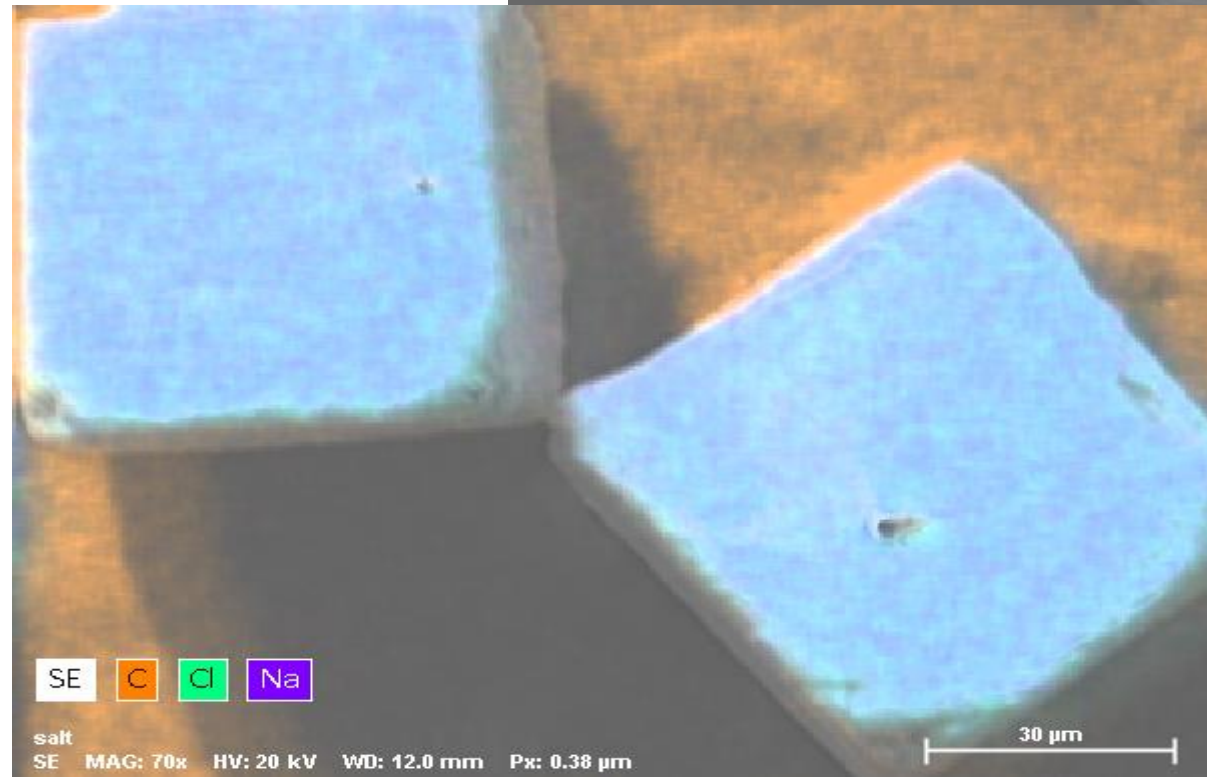
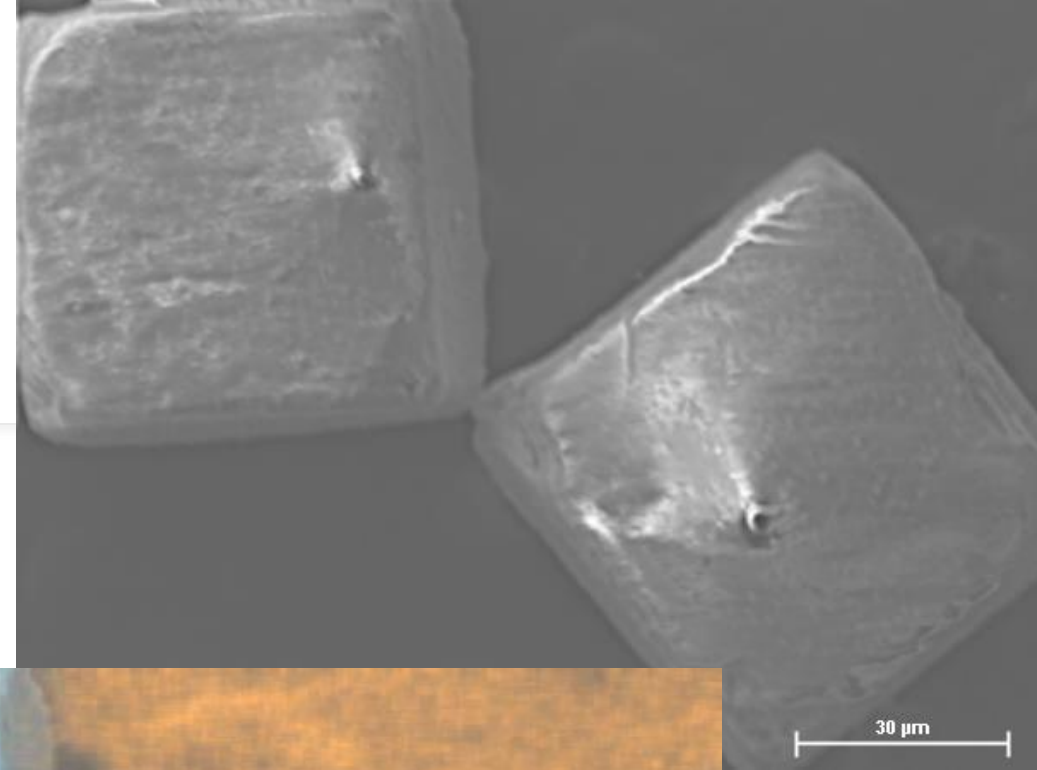
# Analyzing EDS data

- X-rays are plotted based on their energy level and intensity
- Software used to match peaks to elements
- Element quantity is determined by the peak area



# EDS analysis

- Locations of elements are visualized as color maps on the image



# EDS mapping of Kidney Stone

