Research interests of Sawatzky

• Theoretical and experimental studies of possible new magnetic and electronic materials based on molecular beam epitaxy, surfaces and interfaces, polar surfaces, nanostructuring and substitution
• Applications in spintronics MRAMS, hard disk drives, organic photovoltaics
• Ultra thin Epitaxial layers of EuO and N substituted EuO half metallic ferromagnet
• Ultra thin films of simple oxides such as SrO with N substitution of SrS with P substitution
• Ultra thin films of C60 and Oligomers of PPV, Thiophene---
Theoretical methods

• Density functional theory, LDA+U surface and interface electronic structure and point defects in simple oxides
• Exact diagonalization of model Hamiltonians
• Cluster dynamic mean field theory
Experimental methods

- Oxide Molecular beam epitaxy, strained layers, lattice constant control, orbital ordering control, substitution with N, Organic molecular MBE
- Electron energy loss, x-ray absorption, magnetic x-ray dichroism, XPS, ARPES to study electronic structure
- In situ physical properties measurement
- Resonant soft x-ray scattering to study charge spin and orbital spatial density fluctuations