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**From superconductors
to solar energy
conversion -
Characterizing and
controlling electronic
properties and
dynamics**

Superconductors, catalysts, semiconductor based electronics and solar cells, and magnetic storage media - all these are materials where the electronic properties are absolutely crucial for their function. The design of advanced materials in these technologically important areas depends on understanding and controlling the electronic properties not only in the ground state but also in the response to an external stimulus.

Synchrotron radiation based spectroscopy has developed into the essential tool for the characterization of the electronic properties of matter from isolated molecules to complex materials. Lasers and FELs uniquely enhance the synchrotron based characterization methods enabling studies of the (sub-)fs electron dynamics.

Several examples will be discussed linking fundamental science concerning electron dynamics and scattering processes with the design of new and improved materials.

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