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High-lights of solid state physics at ISOLDE

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Solid state physics at ISOLDE aims at the study of the structural, electrical, optical, magnetic and transport properties related to impurities in a variety of technologically and fundamentally relevant materials, including semiconductors, metals, high-Tc superconductors and ceramic oxides.

Rather than providing an extensive overview of the complete solid state physics activities at ISOLDE, this contribution focuses on some of the high-lights of the current research, including
- the lattice location of dopants and impurities in wide band gap semiconductors by means of emission channeling,
- the identification of the chemical identity of optical centers in semiconductors using photoluminescence studies of radioactive impurities,
- the study of the structural and magnetic properties of Fe in semiconductors by means of the Moessbauer effect,
- the understanding of magnetic hyperfine fields at impurities on metal surfaces and within the bulk obtained by means of perturbed angular correlation (PAC),
- the configuration of excess O and F dopants in Hg-based High-Tc superconductors,
- the probing of charge ordering effects in phase transitions of colossal magneto-resistive oxides.

The talk also includes examples that illustrate the benefit of combining results from several nuclear methods that characterize the same system.
It will be shown that this is a particular strength of the solid state research undertaken at ISOLDE and has lead to a significantly better understanding in a number of cases.

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