Universität Münster

Fachbereich Physik

Allgemeines Physikalisches Kolloquium

Donnerstag, 18.07.2024 - 16 Uhr c.t.

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Prof. Roman Engel-Herbert

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Synthesis of Strongly Correlated Electron Systems in the Ultraclean Limit by Molecular Beam Epitaxy

Maturing the thin film growth of emerging materials to reduce the level of defects is a mandatory prerequisite to study their intrinsic physics and to innovate new device functionalities. While this has been done with remarkable success in various traditional semiconductor materials using molecular beam epitaxy, ranging from monoelemental Group IV, to Group III-V all the way to Group II-VI compound semiconductors, it has been found challenging to expand beyond binary oxides, such as ZnO or MgO. In particular, in complex oxide materials containing two or more cations, which include functional oxides with perovskite structure, have been proved notoriously difficult to minimize point defect concentration. This provokes the question:

Can we even achieve semiconductor-grade quality perovskite oxide thin films?

In this talk I will introduce the fundamental challenges utilizing a conventional molecular beam epitaxy approach for the growth of complex oxides and present an alternative – a hybrid synthesis approach – as a potential way out to overcome existing challenges. Promising results obtained by hybrid oxide MBE will be presented and it is shown how peculiar transport phenomena emerge in the ultraclean limit of the material. The application potential of correlated oxides as alternative to replace conventional transparent conductor materials will be highlighted.

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Kolloquiums-Kaffee ab 16 Uhr vor dem Hörsaal

Institutsgruppe 1 – HS 2
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