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**MM 19: Invited Talk (Hauptvortrag) Maier**

Time: Tuesday 9:30–10:00

Location: BAR 205

**Invited Talk** MM 19.1 Tue 9:30 BAR 205  
**Size effects on ion transport and energy storage in nanomaterials** — ●JOACHIM MAIER — Max Planck Institute for Solid State Research, Stuttgart, Germany

Mobile ions enable a palette of applications in particular in the field of energy research and cannot be rendered dispensable by using electrons. Typical examples are fuel cells and batteries. Here nanoionics can have a substantial impact.

Not only can the introduction of interfaces and the variation of their spacing drastically vary conductivities, also qualitative changes can be achieved: insulators can be turned into conductors, electronic conduc-

tors into ion conductors, anion into cation conductors and interstitial into vacancy conductors. The use of true size effects leads to the generation of artificial mesoscopic ion conductors.

Size effects can be of direct relevance for electrochemical devices such as lithium-based batteries. Here effects on cell voltage and ion transport in the electrolytes are considered. Size effects lead, in addition to conductivity anomalies, also to storage anomaly. It is shown that in composites lithium can be accommodated by a "job-sharing" mechanism even though none of the constituted phase may be able to do so. Besides pronouncing the materials science implications, the underlying thermodynamic concepts are emphasized.