

Size Effects on Ion Transport

Joachim Maier

Max-Planck-Institute for Solid State Research
Heisenbergstr. 1, 70569 Stuttgart, Germany
Email: s.weiglein@fkf.mpg.de

The impact of size reduction for Solid State Ionics is discussed, elaborating the consequences for concentration and transport of charge carriers [1,2].

The introduction of interfaces provides a powerful design parameter with regard to ionic defect chemistry and transport properties. The first part of the contribution discusses the impact of isolated interfaces on carrier conductivities. The resulting effects pronouncedly appear in nano-sized systems due to the increased proportion of interfaces ("trivial" size effects). In addition, also local properties may change as a consequence of the reduced spacing of the interfaces (true size effects).

The relevance of these mesoscopic phenomena for defect chemistry and potential applications are discussed. In particular the effect of heterogeneous in- and ex-corporation of lithium in/out of nano-crystalline electrodes is considered.

The contribution also addresses the kinetics of stoichiometry changes and modifications due to interfaces and size effects.

[1] J. Maier, *Solid State Ionics*, in press.

[2] J. Maier, *Solid State Ionics*, **148** (2002) 367.