HYDRIDES FOR ENERGY APPLICATIONS: INSIGHT FROM INELASTIC AND QUASIELASTIC NEUTRON SCATTERING

Maths Karlsson[1]

[1]Department of Chemistry and Chemical Engineering, Chalmers University of Technology, 412 96 Gothenburg, Sweden

e-mail: maths.karlsson@chalmers.se

Hydrogen plays a key role in many materials of high interest to science and society. Important examples are proton conducting materials for hydrogen fuel cells, and materials that can store the fuel (hydrogen) for these devices. The development of new proton conductors and hydrogen-storage materials depends on developing a better understanding of the structure and dynamics underpinning the hydrogen transport and storage properties in currently known materials. However, such an understanding is in many cases lacking, which motivates further experimental and theoretical research. This presentation deals with the application of inelastic and quasielastic neutron scattering (INS and QENS, respectively) as experimental techniques to deepen our insight into the fundamental aspects of energy relevant hydrogen-containing materials, such as proton and hydride-ion conducting oxides and complex metal hydrides [1,2]. After a brief introduction to the non-specialists to the basic principles of INS and QENS, their advantages and disadvantages, I will report on recent progress and discuss future opportunities within this field for research. It is hoped that this will increase the awareness and stimulate new research pertaining to INS and QENS studies of hydrides for energy applications.

References

[1] M. Karlsson. *Phys. Chem. Chem. Phys*. **17** (2015) 26-38.

[2] Neutron scattering Applications in Materials for Energy. *Springer Publishing*. Eds. G. J. Kearley and V. K. Peterson, 2015. ISBN 978-3-319-06655-4.

	Maths Karlsson is Associate Professor at Chalmers University of Technology in Gothenburg, Sweden. Prior to his appointment at Chalmers University of Technology (2011), he was employed as a scientist at the European Spallation Source in Lund, Sweden (2008-2011), where he, outstationed to the Institut Laue-Langevin in Grenoble, France, was engaged in the development of new neutron scattering methods for structural studies of hydrogen-containing materials. Currently, his research group focuses on studies of structure and dynamics in solid-state ionic conductors and luminescent materials, with a view towards their application in various technological devices (e.g., solid oxide fuel cells, batteries, solar cells, and light-emitting diodes). The primary tools to this end involve the use and development of a broad range of neutron scattering techniques.