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SEMINAR

«Materials for hydrogen storage: an overview».

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ABSTRACT

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A large variety of methods are known for storing hydrogen but many issues have still to be overcome before the large scale implementation of hydrogen as an energy carrier becomes effective. The talk will describe the different methods available today. First, the physical hydrogen storage methods, namely compressed gas (70 MPa) and cryogenic liquid (20 K), which are well-developed and mature, will be discussed. Then, a large part of the talk will be devoted to materials for “solid-state” hydrogen storage both through physisorption process and chemisorption (i.e. hydride formation). The talk will try to encompass the different family of materials available ranging from carbons and MOFs for physisorption to some examples of well investigated hydrides: magnesium hydride, alkali borohydrides, alanates, amides-imides and silanides. We will see that more than a decade of intensive research worldwide has resulted in the identification of a number of potential hydrogen storage materials. Although this progress is promising, there are still challenging issues, such as thermodynamic alterations and kinetic improvements that need to be carefully addressed and this will be discussed during the talk.

BIOGRAPHY

Raphaël JANOT studied chemistry at the University of Nancy I in France, where he received a Doctorate in 2001 for a thesis on the preparation by ball-milling in liquid media of negative electrode materials for Li-ion batteries. Then, he was a post-doctoral fellow at LRCS in Amiens working on Mg-based alloys for hydrogen storage. After a second post-doctoral position at LCMTR in Thiais studying other intermetallics for hydrogen storage, Raphaël JANOT joined in 2005 the LRCS (Laboratory of Reactivity and Chemistry of Solids, Amiens) as a CNRS researcher. His recent research activities are focused on electrode materials as well as hydrogen storage. Among hydrogen storage materials, he recently investigated the properties of new phases such as metallic imides-amides and alkali silicides-silanides. His interest also lies in the preparation of porous carbon materials and the effects of nano-confinement on the properties of complex hydrides.

Dr. Raphaël JANOT is responsible for the thematic “solid-state hydrogen storage “of the French program HySPaC (GDR 3652 CNRS) on hydrogen and full cells. R. JANOT has directed 4 PhD students and 6 post-docs and he is the author of 50 peer-reviewed publications, 3 books chapters and 5 patents.

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