Application Form

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Hydrogen Storage Properties of Germane Materials

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Graphene, a two dimensional honeycomb structure of carbon atoms has been extensively studied in the last few years because of its novel properties and its potential use in a wide range of applications. Hydrogenation of graphene (leading to a new material, graphane) has been shown to be reversible thereby making it a potential candidate for hydrogen storage.

As a direct result of the huge attention that graphene is receiving continuously, much interest has been generated by the investigation of other group IV elements like silicon and germanium (which are all known to for m MH4 hydrides).

Silicene and germanene, graphene's "cousins" are considered to be single layers of sp2-hybridized silicon and germanium for ming a 20 honeycomb lattice.
Germanene was until very recently a hypothetical material; in September 2014 M. E. oavila et al. (2014 New J. Phys. 16 095002
doi:10.1088/1367-2630/16/9/095002) reported the successful growth of an atom-thin, ordered, two-dimensional multi-phase film in situ thr ough germanium molecular beam epitaxy using a gold (111) surface as substrate.

With the proposed experiment we are aiming at the investigation for the first time (to the best of our knowledge) of the hydrogen storage properties (uptake and energetics) of germanene materials that our group can now synthesise.
Since this is a quite novel endeavour, we will at first focus an low pressure (up to 1 bar) volumetr ic H2 sor ption measurements an 2-3 samples. These will be carried out at a range of different cryogenic and near-to-ambient temperatures (6-8 in total runs), also in an attempt to derive information about the respective heats of hydrogen sorption.

lt is estimated that the above set of measurements will require approximately 15 days (2 weeks).