

## Investigation of dehydrogenation of Ti-V-Cr alloy by using in-situ neutron diffraction

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### Abstract

Hydrogen is considered as an attractive energy carrier because of its high energy density and pollution-free nature. Among various materials, body centred cubic (BCC) solid solutions and alloys are considered to be promising hydrogen storage alloys. These alloys also have some drawback, one of them is slow activation (difficulty in first hydrogenation). In order to solve this problem, a heat treatment is usually required before the first hydrogenation. It has recently been found that adding 7Zr+10Ni to Ti<sub>50</sub>V<sub>20</sub>Cr<sub>30</sub> alloy eliminates this additional step of heating and this alloy absorbed 3.6 wt.% of hydrogen in 12 minutes. In present work Pressure-composition isotherm of the alloy is measured which revealed that alloy desorbed 1.6 wt% of hydrogen at 150°C. The evolution of the crystal structure upon dehydrogenation was investigated by in-situ neutron diffraction. A fully deuterated sample was heated from 120°C to 266°C under vacuum and neutron diffraction patterns were recorded as a function of temperature. It was found that the alloy started to desorb very quickly at 200 °C. The amount of fcc phase was monitored using the relative intensity of the fcc phase compared to a standard. Crystal structure and morphology of the samples have been studied by the XRD and SEM analysis respectively. Hydrogenation studies were carried out by using the home-made hydrogen titration system.

Dr. Viney Dixit has completed her PhD in December 2018 from University of Quebec at Trois- Rivières, Canada. Her area of research is “*Material Synthesis and Characterization for Hydrogen Storage Application*”. She has done her first Postdoctorate from *Indian Institute of Technology Bombay*, India. Currently, she is working as a *Research Associate* in *Indian Institute of Science Education and Research (IISER)* Thiruvananthapuram, India

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### Biography: