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In-situ X-ray diffaction for hydrogen sorption study of Mg-La alloys

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Trace Na additions can enhance the reaction kinetics of Mg-5%La (wt.%) alloys, resulting in a potential hydrogen storage material. In this study, we used in-situ synchrotron Powder X-ray Diffraction (PXRD) to examine the hydrogen sorption behaviour of the Na-modified Mg-5%La. A setup equipped with a hydrogen gas flow cell and a hot air blower at the Powder Diffraction beamline of the Australian Synchrotron facility is used to allow for PXRD data collection during hydrogen sorption reactions to study the phase evolutions and the cyclability of the alloy. To shed light on the underlying processes during the reactions, in-situ desorption and absorption were performed in a hydrogen atmosphere between 30-480 ℃ and atmospheric pressure to 2MPa H2. Rietveld refinement was conducted using the TOPAS-Academic V6 software to calculate the weight percentage and lattice expansion of each phase in the sample. In addition, in-situ High Voltage Transmission Electron Microscopy (HVTEM) was used as a complementary technique to study the volume expansion properties during desorption as a function of temperature.

Level of Expertise

Student

Presenter Gender

Man

Pronouns

He/Him

Which facility did you use for your research

Australian Synchrotron

Students Only - Are you interested in AINSE student funding

Yes

Do you wish to take part in the Student Poster Slam

No

Condition of submission

Yes

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