



Contribution ID: 144

Type: Oral Presentation

Elastic recoiled detection analysis (ERDA) and Rutherford Backscattering Spectrometry (RBS) investigation of hydrogenated Pd/Ti/Pd multilayer system

Friday, 30 July 2021 12:00 (15 minutes)

ERDA and RBS analysis of hydrogenated Pd-Ti-Pd multilayer stacked film prepared on CT-Ti and Ti6Al4V substrates using an electron beam evaporator were conducted in this investigation. The hydrogenation of the samples was achieved by flowing pure H₂ (100%) and H₂(15%)/Ar(85%) gas mixture while annealing samples at 550°C. The stability of the multilayer stack system at 550 °C was also investigated using RBS for the investigation of possible intermixing of layers and XRD for crystal structure and any possible new phase formation due to elevated temperatures. SEM was used for surface topography investigation. ERDA revealed an average H content of ~ 3.5 at.% in CP-Ti and ~6.2 at.% in Ti6Al4V for samples annealed under H₂(15%)/Ar(85%) gas mixture. We recorded a hydrogen content of ~19.5 at.% in CP-Ti annealed under pure H₂ while ~25.5 at.% was found in Ti6Al4V annealed under the same conditions. Rutherford backscattering spectrometry (RBS) revealed intermixing of layers as evidenced by the diffusion of Pd toward the bulk, while XRD indicated the formation of the PdTi₂ phase in the samples annealed under vacuum and H/Ar gas mixture atmosphere. In-situ, real-time RBS showed that the annealing under pure H₂ preserves the integrity of the Pd catalyst. No indication of the PdTi₂ formation in the pure H₂ annealed samples was observed; instead only the TiH₂ phase appeared, indicating the absorption of H into the system. These results indicated the sensitivity of such a system to the H₂(15%)/Ar(85%) gas mixture.

Apply to be considered for a student ; award (Yes / No)?

No

Level for award;(Hons, MSc, PhD, N/A)?

N/A

Primary authors: MTSHALI, Christopher (iThemba LABS); MAGOGODI, STEVEN (university of western cape); HALINDINTWALL, Sylvain (University of the Western Cape)

Presenter: MTSHALI, Christopher (iThemba LABS)

Session Classification: Physics of Condensed Matter and Materials

Track Classification: Track A - Physics of Condensed Matter and Materials