Electrodeposition of Alloys: a mechanistic evaluation by in-situ techniques

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Electrodeposited alloys exhibit remarkable characteristics, like magnetic and mechanical properties, as well as corrosion resistance. An example are Fe-P alloys as a temporary biodegradable bone replacement material, an alternative Li-ion storage anode, and as a substitute for hard chromium.

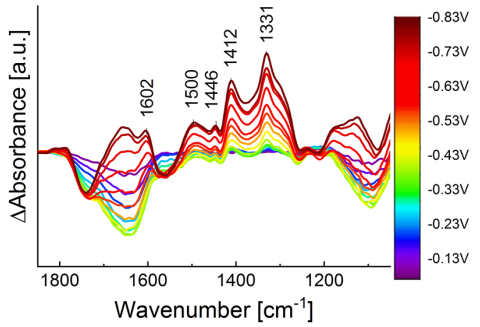

Fig. 1 In-situ FTIR.

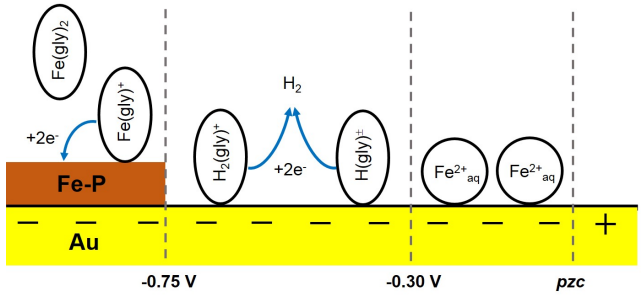

Fig. 2 Double layer structure and mechanism.

A mechanistic investigation of the influence of an additive (glycine) on the alloy electrodeposition is presented applying in-situ techniques such as the Electrochemical Quartz Microbalance (EQMB), in-situ external reflection FTIR spectroscopy (Fig. 1), and the Electrochemical Impedance Spectroscopy (EIS), XRD, corrosion resistance and mechanical properties. Thus a detailed mechanistic evaluation could be achieved (Fig. 2) [1,2].

[1] N. Kovalska, M. Pfaffeneder-Kmen, N. Tsyntsaru, R. Mann, H. Cesiulis, W. Hansal, W. Kautek, Electrochim. Acta 309 (2019) 450.

[2] N. Kovalska, N. Tsyntsaru, H. Cesiulis, A. Gebert, J. Fornell, E. Pellicer, J. Sort, W. Hansal, W. Kautek, Coatings 9 (2019) 189.