Additively Manufactured Functional Materials and their Interaction with Hydrogen

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Abstract
Additively manufactured (AM'ed) alloys might be more prone to hydrogen damage than their wrought counterparts due to a distinguished microstructure, porosity, residual thermal stresses, hydrogen absorption from the printed powder, etc. Hydrogen may enter AM'ed materials during their processing, post-treatments, or service. In this presentation I will review our studies at Tel Aviv University of hydrogen interaction with electron beam melted (EBM'ed) and directed energy deposited (DED'ed) Ti-6Al-4V and QT 17-4+ precipitation hardened (PH) stainless steel. Electrochemical hydrogen charging, gaseous charging, and electrochemical hydrogen permeation were employed. Microstructural effects on hydrogen behavior will be highlighted.

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Short Biography

Noam Eliaz is the Dean of The Iby and Aladar Fleischman Faculty of Engineering at Tel Aviv University (TAU), a professor and the founder of its DMS&E, the founding director of TAU's AM R&D Center, and an endowed Chair Professor for Advanced Manufacturing at Thapar Institute of Engineering & Technology in India. He was elected to the Israel Young Academy (2015) and to the US National Academy of Inventors (NAI, Senior Member, 2020). He served as a member of the committee that prepared the 3rd "State of the Sciences in Israel" report of The Israel Academy of Sciences and Humanities, and as a member of the Governing Board of The German-Israeli Foundation for Scientific Research and Development (GIF). He has garnered numerous awards, including TMS Leadership award (2024), the Electrodeposition Division Research Award (of the ECS, 2021), the IVS 2021 Excellence Award for Research, NACE International's H.H. Uhlig Award (2010), Fellow Award (2012), and Technical Achievements Award (2014), JSPS fellowship (Japan, 2005-7), T.P. Hoar Award for the best paper published in Corrosion Science (2001), Northwestern University's Eshbach scholarship (2013), Fulbright and Rothschild postdoctoral scholarships (1999-2001), etc. He was listed among the top 0.23% scientists over career period (1996-2022 citations) and the top 0.08% in the single year 2022 in the subfield Materials, based on Stanford-Elsevier World's Top 2% Scientists Ranking.