

New frontiers of sustainability and circularity in the galvanic industry

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The interest in scientific research within the metal finishing sector is growing. The demand for durable metals and adaptable manufacturing processes is increasing across a wide range of applications, from aerospace and automotive to machinery and jewelry. In that respect, alloy plating offers better answers in terms of economic growth and environmental sustainability due to fine-tuning composition, morphology, and crystallinity. Here, current trends in alloy electrodeposition research are reviewed highlighting open challenges and process innovations from an industrial perspective. Combining basic electrochemical techniques with spectroscopic, microscopic, and structural techniques is crucial for characterizing the structure-activity relationship for many different technological devices. Particular attention is devoted to advances in industrial quality control and viable solutions for the reduction of precious metal content in electroplated accessories as well as the replacement of cyanide and nickel baths with non-toxic compounds. Project funded under the National Recovery and Resilience Plan (PNRR), Mission 4 Component 2 Investment 1.3 - Call for tender No. 341 of 15 March 2023 of Italian Ministry of University and Research (MUR) funded by the European Union - NextGenerationEU - Project code PE_00000004, CUP B83C22004890007, Project title "3A-ITALY - Made-in-Italy circolare e sostenibile".