USE OF GOLD AND PLATINUM MOD INKS FOR LUXURY BRANDS: A SUSTAINABLE WAY TO MANUFACTURE FASHION ITEMS

APPLICAZIONE DI INCHIOSTRI METALLORGANICI DI PLATINO ED ORO PER L'INDUSTRIA DELLA MODA: UNA SCELTA SOSTENBILE PER OGGETTI DI LUSSO

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Introduction

With the advent of the Fourth Industrial Revolution, research and development within metal finishing sectors observed a renewed interest. The demand for durable metals along with the need to save precious and rare mineral resources, such as noble metals, requires the development of radically new manufacturing processes capable to achieve good final appearance and suitable functionality of a product at the minimum cost regarding row materials and energy.

In this context, we develop a method based on ink jet printing of thermally reducible noble metal–organic decomposition (MOD) inks. The MOD inks can be printed with high accuracy on metallic and ceramic surface for decorative and anticorrosion purposes. The decomposition process is achievable at relatively low temperature and being the inks free of metal particles there are no issues due to condensation and agglomeration. Overall, the method here proposed requires reduced amounts of noble metals and energy compared to traditional electrodeposition or PVD process constituting a more sustainable process for fashion and luxury items.

Material and Methods

The method was developed within a research project funded by Regione Toscana (POR-FSR-2014-2020. Bando 1) and the inks developed in collaboration with an industrial partner (Industrie Bitossi spa). The application of two of them; a gold-based and a platinum-based are here described on different metallic substrates. The inks were jet printed directly on sample surfaces and developed (removal of the organic components) via low temperature (400°C) open air furnace treatment. XPS, SEM and optical microscopy were employed to characterize the morphology and chemical composition of the metallic deposits as well as the evolution of the substrate surface before and after the development treatment wile colorimetric measurement provided quantitative data about color and gloss of the finished surface.

Results

The noble metals were succesfully deveolped in short time (4 minutes) at low temperature (400°C) with only minimal alteration of the substrates. The printed metallic pattern resulted well defined, without voids or disconnections.

Discussion

The method here described constitute an innovative step for fashion and luxury items finishing. The application of MOD-inks via jet printing allows to place them only where it they needs obtaining a practically zero-waste process. Furthermore, the use of low-temperature development inks allows energy consumption reduction contributing to mitigate the process overall resources consumption.