

Barcelona, 8-10 Octubre 2018

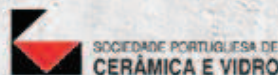
V Congreso Hispano-Luso de Cerámica y Vidrio

LVI Congreso Nacional de la SECV

Barcelona, 11 Octubre 2018

TUTORIAL & Industrial NETWORKING
2D-3D Printing Technologies for Ceramics and Glass

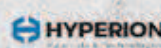
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Tile decoration with greener technologies: spray pyrolysis and solution combustion synthesis for alternative colorations

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The great concern about environmental impacts of different industries is forcing the research in more nature-friendly processes. In the case of ceramic tiles manufacture, decoration stage consumes pigments or frits for special effects whose manufacture requires great amounts of energy. Our group has investigated alternative ways to obtain pigments and decorative effects.

In the case of pigments, solution combustion synthesis (SCS) is an emerging wet-chemical technology which allows the generation of chemically and thermally stable mixed oxides applying low temperatures and very short soaking times. Starting from an aqueous solution of metal nitrates and urea SCS allows the synthesis of a broad range of spinels (based on Al, Fe, Cr, Co, Mn, Ni), which cover an interesting fraction of color space. In addition, the pigments are obtained as very foamy solids composed by nanometer-sized grains. This fact facilitates their milling to the particle size interval typical of ink-jet technology, with lower energy consumption than the pigments obtained through the traditional ceramic method. SCS can be applied to structures different to spinels, but the main difficulty in some cases is the lack of water-soluble precursors for some elements.

Spray pyrolysis has been applied to deposit thin films of some oxides over the glazed tiles surface. This method can be applied in the cooling section of the roller kilns, allowing the use of a fraction of the thermal energy of the tile in precursor's decomposition and oxide anchorage over the glazed surface. Starting from aqueous solutions of nitrates and playing with tile's temperature and precursor's solution concentration, a layer formed by nanograins is obtained with different degrees of surface's coverage. A broad range of effects were obtained over transparent glazes. From delicate reddish shades with iron, to high-gloss metalized surfaces with cobalt or copper.

The viability at lab scale of the two investigated technologies has been demonstrated and interesting products have been obtained. The next stage is the search for partners interested in its industrial scale-up.