NIR reflective finishing coatings with nanoparticle inclusion

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Abstract:

About 40% of the energy consumption of European countries are attributed to buildings. For the construction sector development, it is necessary to ensure the enhancement of sustainability in buildings, eventually by designing new energy- efficient buildings. To accomplish such goal it is crucial to reduce the amount of solar radiation absorbed by buildings. Several solutions have already been reports in the literature, being the development of coatings with high reflectance of the solar energy for envelope system one of the promising methods to be effective in reducing the thermal gains in buildings. Coatings that contain near-infrared reflective nanomaterials can be applied onto a surface (such as roofs, pavements or, façades) exposed to solar radiation to reducing its radiation absorption.

Our study aimed the development of innovative finishing coatings for envelope systems by increasing their solar reflectance through new material formulations with the inclusion of nanoparticles. We studied the reflectance and colour properties by doping a standard black colorant with different types and sizes of nanoparticles (TiO_2 in rutile and anatase phase, Al_2O_3 and CuO), in an acrylic substrate. In particular, such nanoparticles were used with the concentration in the coating being varied (1% to 20%). The results obtained can help formulate new finishing coatings with increased near-infrared reflectance of buildings façades, using, for instance, more than one type of nanoparticles or core-shell structures.

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Biography of presenting author

Rita Carvalho Veloso finished her Master's degree in Chemistry at the Faculty of Science of the University of Porto in 2015. She has been specialized in the development of polymers and study their properties for energy efficiency. In 2019, she was awarded with FCT-funded PhD in Civil Engineering (FEUP, IFIMUP and LNEC) to focus her work on novel nanomaterials with high reflectance for energy-efficient envelope systems, mainly doping finishing coatings for improvement of the performance of ETICS systems.