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Femtosecond laser surface structuring and oxidation of chromiumthin coatings: Black chromium

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ABSTRACT

In view of their potential applications as selective solar absorbers, chromium coatings on float glass substrates were nano/micro structured by femtosecond laser in air. Raman and X-rays diffraction investigations confirmed the formation of an ultra-porous a-Cr(sub2)O(sub3) layer at the surface; higher is the input laser power, enhanced is the crystallinity of the a-Cr(sub2)O(sub3) layer. The a-Cr(sub2)O(sub3) layer with the Cr underneath it in addition to the photo-induced porosity acted as a classical ceramic–metal nano-composite making the reflectance to decrease significantly within the spectral range of 190–1100 nm. The average reflectance decreased from 70 to 2%.

Keywords:

Chromium oxide
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Femtosecond regime
Solar absorbers