
Smart Laser Engraving System for Industrial Glass Texturing

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Abstract

Laser beams are advantageous tools for materials texturing. The absorption of the energy delivered by the laser is a key parameters for the interaction. The use of middle-range infrared wavelength (10.6 μm) allow great absorption by all kind of silicate glass. Moreover, ultra-short pulse (ultra-high intensity) laser also allow good absorption by non-linear effect on a large range of materials. Despite a good knowledge of the light-matter interaction in the literature, decorative industrial processes of glass involve numerous aspects that significantly increase the difficulty for material texturing, i.e. unknown material properties from glass manufacturers, lack of quantitative indicators for material texturing characteristics and experience-based process parameters optimization. This collaboration project aims to create a system that solves those problematics by, first, studying the laser-matter interaction processes that are viable for industrial decoration of silicate glass. Second, setup a characterization system that extracts all the information from the glass surface required for decorative purposes. Third, translate visual information into laser beam process parameters.

Keywords: Laser, Light, matter interaction, Silicate glass, Decoration, Texturing, Machine learning, CO2 laser, Yb:YAG, ultra, short laser

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