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Direct laser-writing of holographic markings for protecting luxury products against counterfeiting

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We present a process that enables the generation of computer-generated hologram (CGH) patterns directly on the surface of metal products made of stainless steel, nickel, brass, gold, or a nickel-chromium (Inconel) alloy. The CGHs are designed by using an Iterative Fourier Transform Algorithm, and then are mapped onto the metal surface using UV nanosecond laser pulses. The laser-generated structures consist of optically-smooth surface deformations (craters and/or bumps), forming reflective diffractive optical elements (DOEs) capable of generating diffractive images in the far field. The images can contain information about the marked products (e.g. serial number), providing their unique identification and traceability. Moreover, the holograms can contain additional security features, e.g. miniature signatures and identifiers invisible to the naked eye, and also can be embedded into standard marking patterns (e.g. QR codes). In this way, they can form aesthetic “steganographic” markings in which secret information is hidden inside an ordinary, easily-readable message.

Topic: Micro Processing – Surface Functionalisation

Keywords: Laser marking, security markings, surface modification, holograms

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