Direct laser writing of anti-counterfeiting holographic structures on metal products

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Trade of counterfeit products is a well-known, world-wide problem that causes serious harm to the global economy and society. Tackling this problem is not an easy task, and the manufacturers of genuine products must always be at least one step ahead of counterfeiters in order to protect and secure the intellectual property (IP). Currently, a range of different security markings are used. The most common are polymer holographic stickers that are attached to a product using adhesive. An attempt to remove such stickers results in permanent damage to the hologram, hence they cannot be applied again onto a forged item. However, such holograms are prepared by a replication process so forged holographic stickers can be manufactured at low cost.

In this presentation, we present a different approach for marking metal products in order to protect them from counterfeiting. In this case, a UV nanosecond pulsed laser is used for the generation of optically smooth craters on the surface of a metal. By producing such craters in specific locations, it is possible to generate holographic structures that contain information about the marked item (e.g. a serial number or part number). As will be shown during this presentation, the holograms are resistant to abrasion, high temperatures, and tampering because they are permanently embedded in a product. The laser-generated holograms can also contain additional security features, e.g. miniature signatures and identifiers invisible to the naked eye, which makes them a powerful weapon in the battle against counterfeiting practices.