Basic Research of Intrinsic, Tamper Indication Markings Defined by Pulsed Laser Irradiation, David P. Adams, Sandia Labs, IACRO 13-5897I

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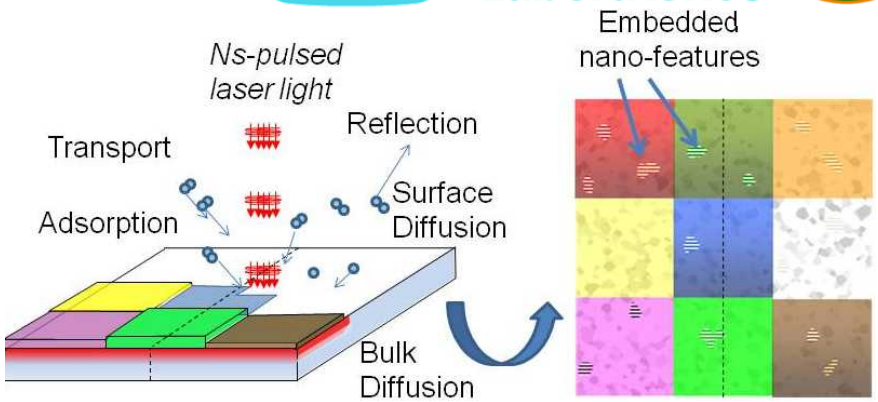
Objective: We will research how short (ns) and ultra-short (fs) laser pulses interact with the surfaces of various materials to create complex color layers and morphological patterns.

Method: We are investigating the site-specific, formation of microcolor features. Also, research includes a fundamental study of the physics underlying periodic ripple formation during femtosecond laser irradiation.



Status of effort: Laser induced color markings were demonstrated on an increased number of materials (including metal thin films) and investigated for optical properties and microstructure. Technology that allows for marking curved surfaces (and large areas) has been implemented. We have used electro-magnetic solvers to model light-solid interactions leading to periodic surface ripple patterns. This includes identifying the roles of surface plasmon polaritons.

Personnel Supported: 2 Technical Staff, 2 Professors, 2 Students, 1 Postdoc, 1 Technician.

Publications & Meetings: (this FY) 3 Submitted Papers, 4 Conference Presentations, 1 PhD completed in past 12 months.

Goals/Milestones

- Research corrosion resistance of oxide color markings (salt spray, fog, polarization tests).
- Through modeling, investigate effects of multi-source scattering and interference on ripple patterns.
- Investigate microspectrophotometry for mapping color.
- Investigate new methods for laser color marking curved surfaces and large areas.

Funding Profile

$349k FY11; $350k FY12; $350k FY13; $350k FY14; $350k FY15

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