

Material Activation Processes Leading to Surface Modification

David P. Taylor

*Mechanics and Materials Technology Center, The Aerospace Corporation, 2350 E. El Segundo Blvd
M5/753, El Segundo, CA 90245, David.P.Taylor@notes.Aero.org*

Our laboratory is exploring a number of ideas which use lasers for controlled surface modification. Enough selectivity in laser surface modification has been observed to encourage us that it is possible to advance the understanding of fundamental photophysical processes. The goal of this effort is to 'tailor' the surface with nanometer scale precision on a by exploiting 'materials activation' processes. In the case of conductors, our approach involves the collective excitation of electrons (i.e. plasmons) initiated with the coherence of the light source. In the case of non-conductors, our approach involves exploiting the role of defects and defect density in the laser - materials interaction. Both approaches require advancing the basic understanding of these 'materials activation' processes. The ideas which will be presented are:

1. Collective Surface Excitation Mediated Physics in Low-Fluence Laser Material Interactions;¹
2. Superlinear Photon Stimulated Desorption in Germanium;²
3. Modification of Embedded Surfaces in Engineered Materials.³

¹ Henry Helvajian

¹ David P. Taylor & Henry Helvajian

¹ Jim Barrie & Henry Helvajian