

Forewords

Using recent progress in laser technology and in particular in the field of ultra-fast lasers, we are getting close to accomplishing the alchemist dream of transforming materials.

Compact lasers can generate pulses with ultra-high peak powers in the Tera-Watt or even Peta-Watt ranges. These high-power pulses lead to a radically different laser-matter interactions than the one obtained with conventional lasers. Non-linear processes are observed leading to new and exciting opportunities to tailor the intrinsic properties of matter with sub-wavelength spatial resolutions and in the three dimensions.

This new way of processing material has numerous potential applications, not only in integrated optics (waveguide writing, novel polarization devices, Bragg gratings, devices for future quantum communications, etc.) but also for optomechanics (sensors, actuators, etc.) and optofluidics (lab-on-a-chips).

This field of research is still at its infancy. Numerous aspects of non-ablative laser-matter interactions (below the ablation regime) have yet to be understood and its full potential has yet to be unraveled.

This proceedings gathers the communications made during the workshop entitled ‘Progress in Ultrafast Laser Modifications of Materials’ and organized from the 14th to the 19th of April 2013 at the ‘Institut d’Etude Scientifique de Cargèse’ located in Cargèse, Corsica.

The workshop covered the science and technology of ultrafast laser modification of materials, from the fundamentals – the interaction of ultrafast non-ablative pulses with dielectrics and other transparent materials, to the applications in various technological fields. It gathered about eighty participants from all over the world, featuring a total of thirty three invited oral contributions, eight shorter oral presentations and twenty one posters.

The Organizers