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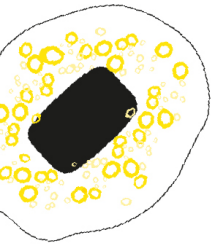


Invitation Colloquium Series | Materials Science and Engineering

LASER PROCESSING

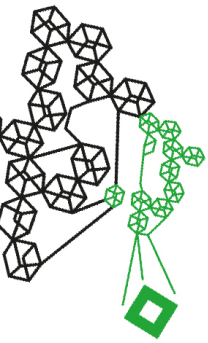
Date: 18 November 2021 | Time: 15:45 – 17:30 hrs

This is a hybrid session!
Join us online via **Zoom**: https://utwente-nl.zoom.us/j/82860937753
or in person, at **OH115***

*for students and staff of UT only; max capacity of 96 people

Speakers:
Prof.dr.ir. Gert-willem Römer
Professor at the Chair of Laser Processing at the department of Mechanics of Solids, Surfaces & Systems (MS3) of the Faculty of Engineering technology

Dr. Matthias Feinaeugle
Assistant professor at the Chair of Laser Processing at the department of Mechanics of Solids, Surfaces & Systems (MS3) of the Faculty of Engineering technology



Abstract:
Prof.dr.ir. Gert-willem Römer
Due to its specific properties, the laser source has evolved into a device which is used for several applications, including material processing. High power LASERs can be used for processes like cutting, welding, surface treatments and micro- or nano-manufacturing. In comparison to conventional (thermal) processing, such as plasma cutting, and TIG or MIG welding, processing with laser sources is: fast, accurate, flexible in terms of the type of material to be processed and product geometry, and show a small heat-affected-zone, and is easy to automate. This is why the laser can (and does) not only replace conventional mechanical and thermal processing, but also opens possibilities for new processing methods. Depending on the pulse duration, laser wavelength and intensity the laser-material interaction is thermal (referred to as photo-thermal interaction) or non-thermal (referred to as photo-chemical interaction). Many laser processing applications are based on photo-thermal processing. As an example, laser-based Directed Energy Deposition (DED) using a 10kW laser source will be discussed, as well as applications (in the field additive manufacturing of large scale (1 to 10 m) metallic products for the off-shore industry (e.g. ship propeller) and steel production industry) will be shown and discussed. Then applying laser pulses with durations in the range of femto- to picoseconds, the absorbed laser energy will not heat

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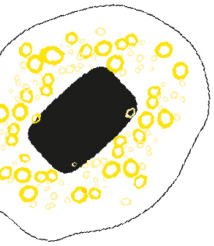
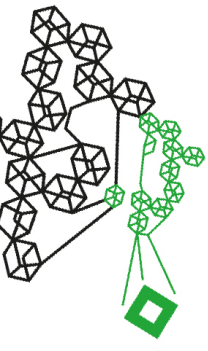


the material, but will directly break the chemical bonds in the material. Unlike thermal processing, where repeatability is hindered by the randomness of the melting process, this results in increased accuracy of the machining process down to the micro-meter and nano-meter scale. The latest fundamental aspects of the process, as well as applications (e.g. in the field of surface texturing will be presented and discussed.

Dr. Matthias Feinaeugle
Laser-induced Forward Transfer (LIFT) is an Additive Manufacturing technique, which allows to transfer nearly any material on the micro-meter scale. It has the potential to print three-dimensional micro-structures. The donor material to be printed consists of a thin film, which is supported by a carrier substrate. The carrier substrate is transparent to the incident laser wavelength. When a pulsed laser beam is focused on the carrier–donor interface the absorbed laser energy ejects the donor material onto a receiving substrate. The latter is usually referred to as the receiver. Besides in liquid phase, the donor material can also be transferred in solid phase. This work presents methods, tools and results of LIFT-printing copper and gold 3D structures and their potential applications.

About the Colloquium Series:
The Materials Science & Engineering Colloquium Series provides a platform for all those who are interested in materials science, whether you are a student, researcher at MESA+, faculty member, or working in industry. During each session, a challenging case will be presented by an expert, for example from industry. All cases are based on a realistic problem where a solution was found by combining existing materials science knowledge and new insights through an experimental or materials system model approach.



Save the Date for the Next Editions:

9 December 2021 | Time: 15:45 – 17:30 hrs

13 January 2022 | Time: 15:45 – 17:30 hrs

More information: www.utwente.nl/master/materialsscience