



# SEMINAR

## Young Researchers in Mechanical Engineering



# Rapid prototyping in micro-scales through advanced manufacturing processes and micro-injection moulding

### SPEAKER

Dr. Mert Gülçür, Lead Engineer, Centre for Imaging, Metrology, and Additive Technologies

(WMG-University of Warwick, UK)

### ABSTRACT

Upscaling the manufacture of miniature technological products requires the use of precise mould tools for replication processes, especially in high-margin markets such as medical devices, optics, and microsystems. The procurement of such moulds stands out as the most expensive and resource-intensive phase in micro-injection moulding and hot embossing processes due to strict dimensional requirements, including feature size and tolerances. This cost factor poses a challenge to the rapid advancement of emerging novel medical technologies such as microfluidics and microneedles which necessitates multiple design iterations and faces prohibitive tooling expenses. In this context, the rapid utilisation of existing advanced manufacturing processes for micro-injection mould making is of crucial importance. Primarily, this talk will provide an overview on micro-injection moulding and relevant tooling technologies, including 3D printed rapid tools. Secondly, there will be a detailed discussion on the development of specific products, namely, microneedles and microfluidic chips through aforementioned methods. The talk will give a comprehensive overview in rapid-prototyping in micro-scales and associated challenges in tool making, data-rich process monitoring and metrology for technological product development.

### ABOUT THE SPEAKER

Dr. Mert Gülçür obtained his PhD degree in micro-nano manufacturing from University of Bradford, UK in 2020. His doctoral research was funded within the Marie Skłodowska-Curie Actions (MSCA) European Training Network on “Zero-defect Net-shape Micro-manufacturing” (MICROMAN). Prior to his PhD, he completed an MSc in Optics and Photonics at Karlsruhe Institute of Technology, Germany in 2015, through a German Academic Exchange Service MSc Scholarship. He has BSc degrees from Gebze Technical University in Materials Science and Engineering, and Physics (minor). Dr Gülçür is actively conducting research in the advanced micro-nano manufacturing area with a specific focus on micro-injection moulding, micro-tooling, data-rich manufacturing and metrology. He is currently working as a Lead Engineer at WMG, University of Warwick for developing rapid prototyping services to a large variety of sectors and businesses including medical, micro-fluidics and optics. Since his move to Warwick in 2022, he has acquired research projects with a total value in excess €1M funded by EPSRC, High-Value Manufacturing Catapult, and European Commission. Most recently, he has won a prestigious Horizon Europe MSCA Postdoctoral Global Fellowship in the 2023 call to develop novel micro-nano lithography and 3D-printing methods at University of Texas at Austin, USA.

### ZOOM DETAILS

<https://zoom.us/j/3033518323?pwd=cTJSTUQ3YWJmV01LcC9reG5GV3J4QT09&omn=97675245506>

Meeting ID: 303 351 8323. Passcode: 04ujBE

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