High vacuum compatibility of 3D printed parts

Michele DELLA CIANA, CNR-IMM & University of Ferrara

During the last decade, 3D printing has started to play a crucial role for all those activities that require fast and customizable prototyping.

Within experimental physics and chemistry, the ability to customize an experimental setup according to the needs of a specific application is crucial for the success of the latter.

In this context, the main issues in the usage of 3D printed parts is the resistance of the available materials. In particular in many situations high thermal resistance and/or high chemical resistance are necessary. These characteristics are generally accessible together with the specifications of a material, however more specific properties are generally not provided, one of these properties is the compatibility of 3D printed parts with high vacuum environments (∼10−6 mbar). During this seminar, the compatibility for high vacuum applications of some of the most used polymers, printed both in filament (FDM) and in resin (SLA) will be briefly presented. Particular attention will be given to the so-called super-polymers (PPS, PEEK, High thermal resins), since they are the only ones that can withstand the temperatures necessary for a proper high vacuum conditioning without deforming.