



Contribution ID: 678

Type: **Contributed talk**

## Utilizing 3D Printed Plastics for High and Ultra-High-Vacuum (UHV) Environments: A Feasibility Study

*Friday 30 August 2024 12:00 (15 minutes)*

The demand for cost and time-effective and customizable components for high-vacuum (HV) and ultra-high-vacuum (UHV) systems has prompted exploration into the application of 3D printing technology. This study investigates the viability of utilizing 3D printed plastics in UHV environments by evaluating their outgassing properties. An extensive evaluation of 3D printing materials was carried out, highlighting the best polymer composition candidates using two of the most common 3D printing techniques, Fused Deposition Manufacturing (FDM) and Stereolithography (SLA). Further experimental investigations are conducted to assess the performance of select 3D printed plastics under UHV conditions, focusing on their ability to maintain structural integrity, minimize outgassing, and withstand baking temperatures. Furthermore, residual gas analysis was used to evaluate the materials compatibility with NEG coated systems. The findings suggest that certain 3D printed plastics exhibit promising characteristics for use in HV and UHV systems, with notable examples including polypropylene (PP) and polyether ether ketone (PEEK). A comparison between machined and 3D printed parts demonstrated that challenges such as porosity and surface roughness showed not to be of great concern.

### I plan to submit also conference proceedings

No

**Primary author:** DOMINGUES, Artur (MAX IV)**Co-authors:** MARTÍNEZ CARBONERES, Ana (MAX IV Laboratory); HAASE, Dörthe (MAX IV Laboratory); HERMANSSON, Emma (MAX IV Laboratory)**Presenter:** DOMINGUES, Artur (MAX IV)**Session Classification:** Mikrosymposium 14/2: Miscellaneous Topics**Track Classification:** 14. Miscellaneous