

## PEEK Nanostructures and Nanocomposites obtained by Hot Embossing into TiO<sub>2</sub> nanotube layers

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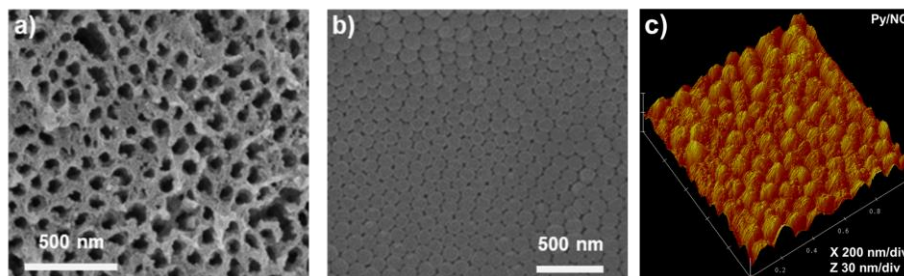
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Poly-ether-ether-ketone (PEEK) is a semicrystalline thermoplastic polymer with outstanding physical and chemical properties. PEEK is qualified for harsh conditions e.g. vacuum, cryogenic and radiation. The technological applications of PEEK extends from biomedical to aerospace fields. Moreover, PEEK is compatible with additive manufacturing processing. PEEK has been employed also as matrix for nanocomposites providing new capabilities for aerospace applications. In this work, we present the resulting PEEK nanostructured surfaces and composites, after fast and scalable hot embossing (nanoimprint) process[2] into anodic TiO<sub>2</sub> layers[3]. The resulting nanostructured surfaces morphologies are porous PEEK surfaces (Fig.1 a) and TiO<sub>2</sub> nanodomains in a PEEK matrix (Fig.1 b). The nanoporous surfaces withstand acid etchants and vacuum conditions, and are stable below 300 °C, which make them suitable for aggressive environments including some space and planetary conditions. On the other hand Magnetic Permalloy (Py) thin films have been deposited on TiO<sub>2</sub> nanodomains (Fig.1 c) showing interesting magnetic properties[4].

### References

- [1] M. Rinaldi, et al. *Polymers*, 13, 11 (2020)
- [2] M. Worgull, *Hot Embossing – Theory and Technology of Micro Replication*; William Andrew: Oxford, U.K., (2009).
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### Figures



**Figure 1:** a) Nanoporous PEEK surface b) Nanodome surface c) AFM image of Py deposited on nanodomains