

Ceramic filters for air purification

The aim of the proposed thesis is to investigate the possible formation of re-usable ceramic air filters to purify various contaminants such as viruses, bacteria, dust, etc. In order to produce filters; first metal-containing (Mn, Fe, Cu, Zn and Ag) polysiloxane precursors will be synthesized by simple chemical reactions of metal acetates with polysiloxane base precursor, then the formation of porous ceramic materials will be formed via combination of an environmentally friendly freeze-casting with 3D printing (additive manufacturing) technique. Such process will significantly improve the speed and homogeneity of the formed components and results in the processing of precisely reproducible components in an ecologically conscious manner. The formed samples will be characterized in detail not only structurally but also for their air permeability & bio-compatibility, and analyzed for economic benefits and eventual manufacturing of a prototype.



Figure 1.(a, left image) Digital photo of 3D printer; (b, left image) an example air filter mask together with spare filters made from highly porous ceramic bodies.

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