

Oral abstract

Mechanically-architected silicone elastomer membranes for biomedical applications

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A simple process was developed in our laboratory in order to craft biocompatible elastomer membranes with controlled mechanical anisotropy. In elastomer materials, mechanical properties are basically related to their polymer network, so adjusting the crosslinking density will tailor their macroscopic behavior.

A medical-grade liquid silicone rubber, provided by Bluestar Silicones, was cast in a mold and UV-irradiated, in the presence of a photo-inhibitor, prior to regular crosslinking at hot temperature. In the irradiated zones, the crosslinks are fewer than in non-irradiated zones. This allows obtaining, through the same molecular network, a wide range of mechanical properties. Moreover, using masks with special pattern permits, in the core of the material, a local control of the mechanical anisotropy (see Figure 1).

In this presentation, we will present the full mechanical characterization of our biocompatible membranes, including the measurement of the interfaces existing between irradiated and non-irradiated zones. We will also demonstrate the power of this process to find application in a very wide range of fields, such as processing auxetic materials, patterning physical properties, or controlling the silicone adhesion.

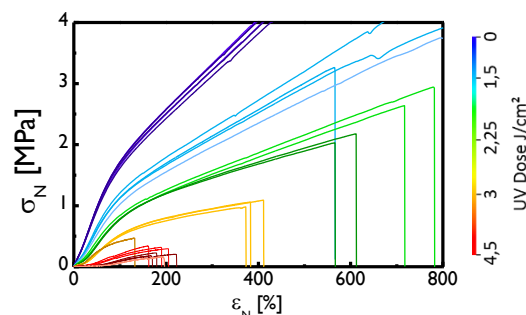


Figure 1: Range of tensile properties obtainable through UV irradiation prior to crosslinking