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## Mechanical effects of aging in silicone breast prostheses

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Since their introduction by Cronin and Gerow in the early 1960s, silicone breast prostheses have been widely used both in aesthetic and reconstructive medicine, facing changes in shape and texturing over the decades. The average life of a prosthesis varies between 12 and 35 years, and phenomena concerning the dispersion of the silicone inner gel in the patient's body due to the loss of outer silicone shell integrity are not uncommon. The most frequent causes of shell rupture can be ascribed to damage from surgical instruments during implantation and to unidentified openings due to traumas and accidental impacts: ruptures may not be noticed immediately and can remain silent for months until symptoms emerge. They may include pain, chronic inflammation, disfigurement and may be followed by subsequent additional surgeries.

The aim of this work is to investigate possible changes in physical and mechanical properties of breast prostheses shell and filler materials, related to the effects of the environment during the implantation period, which can affect early ruptures. Some specimens obtained from new prostheses are being subjected to a twoyear accelerated aging process at four different temperatures (37°C, 60°C, 75°C, 90°C) in physiological saline solution.

Since aging is still ongoing, partial results of the periodical tests conducted on aged are presented. A significant reduction of failure elongation of prostheses shell with aging and a corresponding variation of strength is already shown in the most critical aging conditions. Furthermore, to better investigate the stiffness of the material, two new identical prostheses were considered. One was compressed until rupture, to achieve data on the final load and deformation. The other one is undergoing an aging process at 37°C in saline solution and it is periodically tested. At this time, no clear variation of silicone stiffness has been observed due to the short aging time passed. The effects of longer aging times will be presented.

### Biography:

Michela Arnoldi is a young researcher; she has completed her graduation from Politecnico di Milano in Aeronautical Engineering and she is following a financed research project on the employment of advanced materials characterization techniques in biomedical applications.