

**SEMINARIO, 17 maggio 2017, 10:00, aula Seminari DICATAM
via Branze 43, Brescia**

Green mechanical-to-electrical energy conversion with soft dielectric elastomer devices.

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Dielectric elastomer generators (DEGs) are promising devices able to convert mechanical to electrical energy by exploiting the variations in the capacitance of a deformable dielectric membrane.

In the talk, I will describe the research that my collaborators and I have carried out in recent year on this topic. In the first part, the main features of the electro-elastic model employed in the analyses will be introduced. The thermodynamic cycle leading to conversion is formed by four strokes, while four failure modes of the DEG are accounted for: electric breakdown, electromechanical instability, ultimate stretch, and loss of the in-plane tensile state. Then, the conversion performance of two generator layouts will be described: in-plane equibiaxial loading of a rectangular dielectric membrane and out-of-plane loading of a prestretched annular dielectric thin film. For the former, a design diagram is obtained where position of optimal configurations to maximise either harvested energy or efficiency is highlighted. For the latter geometry, performance is determined in relation to: (i) initial prestretch of the membrane, (ii) external-to-internal radius ratio, and (iii) intensity of maximum external load. The seminar concludes with a comparison between the behaviours of two different soft materials (i.e. an acrylic elastomer and a type of natural rubber), and an estimation of the most effective generator geometry among those analysed by the research group.

Seminario e visita di ricerca finanziati su fondo di Ateneo per attività di carattere internazionale