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Towards the realization of post-silicon smart systems: IPMC based sensors

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In next future, smart systems will be developed, capable of solving tasks in strategic fields such as bio-inspired robotics, aerospace, medicine, just to mention a few. These systems will be required to embed a number of functions including, electric power generation and storage, signal sensing and processing, and actuating capabilities. Also, their miniaturization and biocompatibility will be of interest. "More than Moore" solutions will complement silicon based devices with new technologies. Polymeric materials are suitable for energy scavenging, for the realization of organic electronic devices, and for obtaining reversible energy transduction. Ionic polymer-metal composites (IPMCs) are nano-composited materials, with electromechanical transduction capabilities, relevant to the realization of post-silicon smart systems, since they have sensing, power harvesting and acting capabilities. The presentation will focus on IPMCs as a valuable technology towards the realization of sensing functionalities. More specifically, IPMCs as generating sensors, cantilevered vibrating sensors, and smart coupled actuating-sensing elements will be described. The possibility to exploit such sensing principles for the realization of sensing systems in fields such as fluids rheological properties measurements and medicine applications will also be shown. Finally, it will be shown how the research activity on IPMC sensors is a multidisciplinary task. IPMC are quite new materials and many efforts are still required before they can become a mature technology. To this aim, attention will be given to the challenges imposed by the envisaged applications, on production technologies and system modeling.

Biography

Salvatore Graziani received MS degree in Electronic Engineering and PhD degree in Electrical Engineering from the Università degli Studi di Catania, Italy, in 1990 and 1994, respectively. Since 1990, he has been with the Dipartimento di Ingegneria Elettrica, Elettronica e Informatica, University of Catania, where he is an Associate Professor of Electric and Electronic Measurement and Instrumentation. His primary research interests lies in the field of polymeric sensors and actuators, signal processing, multisensor data fusion, neural networks, software sensors and smart sensors. He has coauthored many scientific papers and two books.

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