Dipartimento
di Ingegneria Chimica,
dei Materiali e della
Produzione Industriale
Università degli Studi
di Napoli Federico II

AVVISO DI SEMINARIO

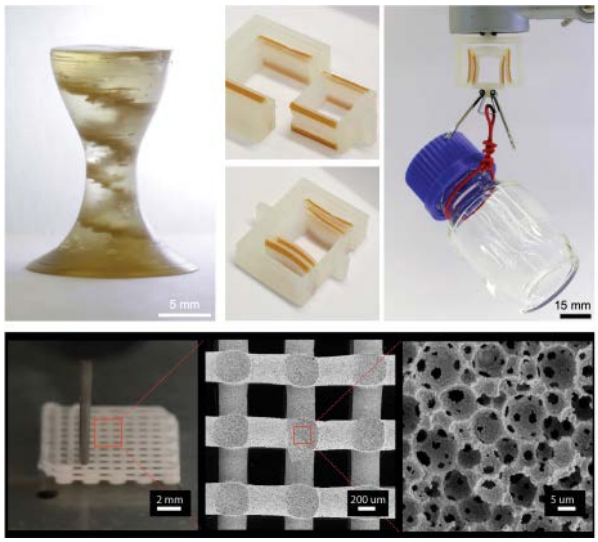
Venerdì 12 Maggio alle ore 14.30
in Aula Malquori del Dipartimento di Ingegneria Chimica, dei Materiali e della Produzione Industriale

Dr. André R. Studart

Complex Materials, Department of Materials, ETH Zurich, 8093 Zurich, Switzerland

terrà un seminario dal titolo:

3D Printing of Hierarchical Porous Materials



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ABSTRACT

Porosity is extensively exploited in natural materials as an effective means to reduce weight, minimize the use of resources, enable the transport and storage of nutrients or create high-surface area structures. Examples range from the structural elements of plants to skeletal parts of invertebrates and vertebrates, including plant leaves and stems, animal skulls, bird beaks, marine sponges and animal quills. Because porosity inevitably reduces the strength of materials, the incorporation of pores should occur with minimum impact on the mechanical performance of the load-bearing structure. To this end, porous biological materials often exploit porosity gradients at multiple length scales to generate mechanically efficient structures. The implementation of these concepts in synthetic systems remains challenging due to the lack of appropriate processing techniques that enable control over the size and distribution of pores in man-made structures. In this talk, I will present a new processing route for the 3D printing of porous structures of high mechanical efficiency through the creation of hierarchical porosity. The use of foams and emulsions as templates enables the generation of inks that are stable enough to be directly extruded into structures with hierarchical and graded porosity. Exploiting this concept in engineering applications should lead to the rational utilization of building resources, the minimization of energy demand for transportation and even the reduction of costs without impairing the targeted functionality.

Short biography – André R. Studart

André R. Studart is Associate Professor for Complex Materials at ETH Zurich, Switzerland. He obtained his BSc and PhD degrees in Materials Science and Engineering from the Federal University of São Carlos, Brazil. His main research theme has been centered around the design and processing of colloidal systems into materials with unusual structures, properties and functionalities. Currently, he leads a team that works at the interface between soft matter research and materials sciences and engineering. Inspired by biological materials like bone, teeth and wood, the group investigates new directed assembly routes to create synthetic materials with unprecedented microstructural control and functional response. Before establishing the Complex Materials group, André also carried out research on novel methods for processing of refractory castables and near-net-shape advanced ceramics (PhD thesis), mechanical properties of dental materials and ceramics processed through colloidal routes (post-doctoral work at ETH Zurich), and porous inorganic materials obtained using microfluidic techniques (post-doctoral work at Harvard University). His academic research was awarded by Alcoa Co., Thermo Haake Co., Brookfield Co, Magnesita, the Brazilian Ceramic Society, ETH Zürich and the Swiss National Science Foundation (ERC-equivalent Consolidator Grant).