



UNIVERSITÀ  
DEGLI STUDI  
FIRENZE

**DICEA**

DIPARTIMENTO  
DI INGEGNERIA CIVILE  
E AMBIENTALE

## Avviso di Seminario

**Mercoledì 12 novembre 2025**

**h. 15.00 – Aula Caminetto (Sede di Santa Marta)**

### **The Rearrangement Theory with Applications in Mechanobiology**

**Prof. Alberto Salvadori**



**Università di Brescia**

Dipartimento di Ingegneria Meccanica e Industriale

#### **Abstract**

Building upon the classical chemo-mechanical theory of Larché and Cahn for equilibrium, numerous studies have investigated the transport of species in solids, with or without trapping phenomena. In most applications – such as the swelling of hydrogels, hydrogen embrittlement in metals, and the transport of lithium or sodium in battery electrodes – the formation of a new phase or compound can be directly associated with the concentration of the diffusing species. In the first part of the seminar, we focus on the formation of solid mixtures made of multiple compounds, each characterized by its own volumetric expansion coefficient. The classical chemo-mechanical framework is naturally recovered as a particular case of the proposed formulation. This perspective is further elaborated in the second part of the talk, which focuses on mechanobiological applications such as hemostasis and cellular motility to name two. They are characterized by the evolution of a network of biological fibers (fibrin, actin) that are generated by a chemical reaction within a liquid following a biological signaling event. Such a network acquires mechanical attributes, such as elastic stiffness, that were previously absent in the system. To model such systems, the classical chemo-mechanical theory of Larché and Cahn for equilibrium and others addressing transport and chemical reactions that assume a pre-existing solid network need to be extended. Therefore, a new theory is proposed which describes the creation of new solid mixtures by network polymerization.

**Prof. Paolo Maria Mariano**

Via Santa Marta, 3 – 50139 Firenze

Tel. +39 055 2758893 | e-mail: [paolomaria.mariano@unifi.it](mailto:paolomaria.mariano@unifi.it)