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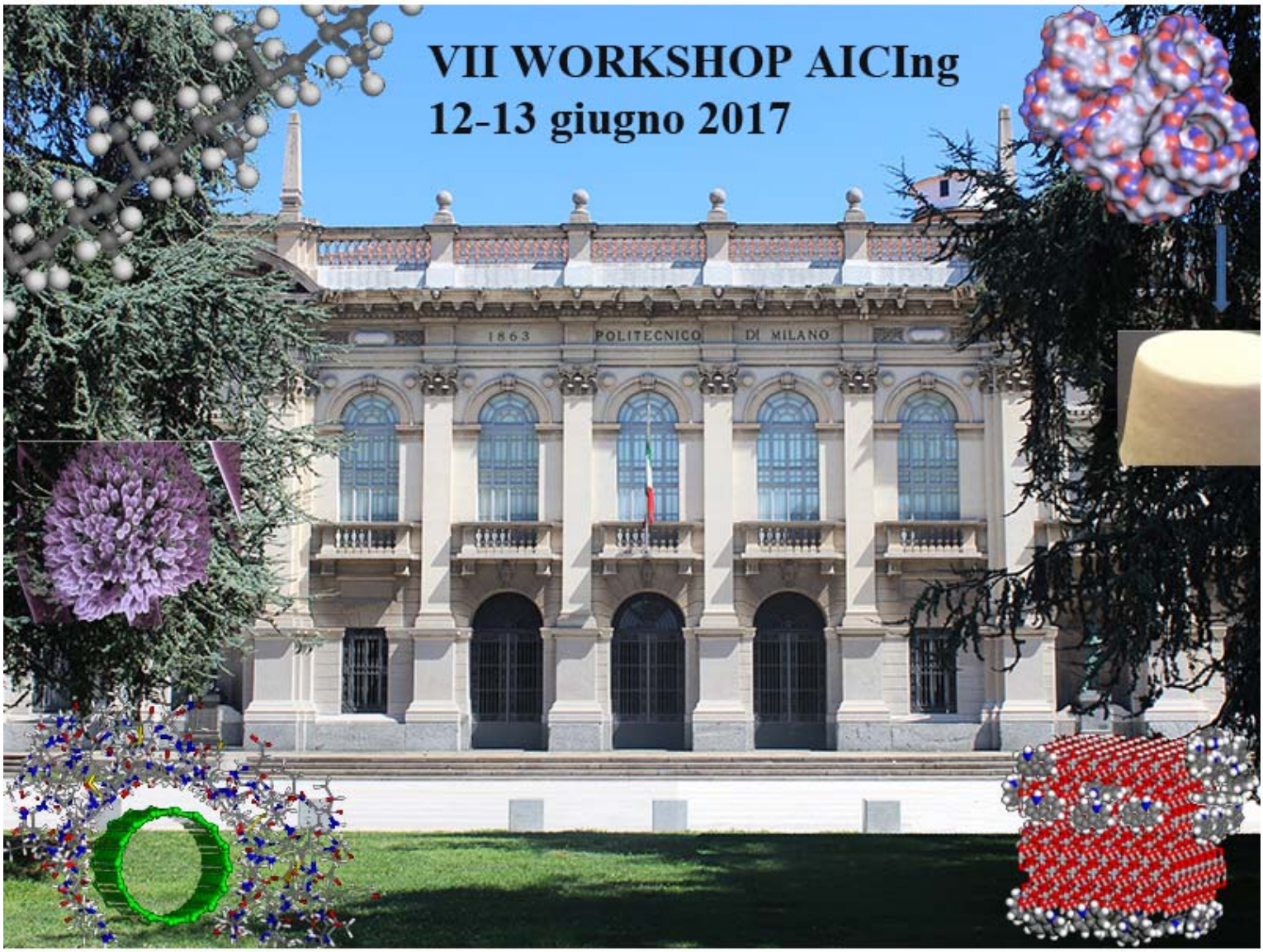

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Associazione Italiana di Chimica per Ingegneria

SMART MATERIALS FOR TECHNOLOGY: PREPARATION, SELF-ASSEMBLY, CHARACTERIZATION, MODELING

ATTI DEL CONVEGNO

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Humidity/temperature sensing cotton fabric based on MWCNTs hybrid coating

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Carbon nanotubes (CNTs) have attracted the interest of the scientific research in several fields thanks to their intrinsic chemical-physical properties [1] and their cylindrical structure that make them, furthermore, capable of molecular transport. Thanks to their electrical properties, CNTs can be used in sensoristic and electronic fields, but at the same time, they can be considered as a viable alternative to traditional conductive inorganic materials. Indeed, CNTs are able to detect variations in environmental chemical composition [2] or toxic gas molecules at room temperature, and they can be employed for the realization of electric circuit for flexible and wearable electronics. Recently, the demand for conductive fabrics is increased both for the realization of "technical fabrics" [3] and "smart textiles" which provide applications in different fields such as sports, healthcare, military, security and so on. With the aim to combine the sensing and electronic features of CNTs with mechanical characteristics of a fabric, a humidity/temperature sensor cotton fabric based on a conductive coating containing Multi Walled Carbon Nanotubes (MWCNTs) dispersed in a polymer matrix has been designed. The realized MWCNTs-cotton based sensor was fully investigated by different chemical-physical techniques in order to evaluate the morphology of the coating. Sensing properties were studied by measuring changing in the surface resistance (R_{sheet}) at different relative humidity and temperature conditions. In particular, R_{sheet} seems to be influenced by water molecules that interact with MWCNTs connections. Experimental findings demonstrated the sensing properties of the realized MWCNTs coating toward humidity and temperature and its potential employment as a component for a humidity/temperature sensor.

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