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DEL SANNIO Benevento

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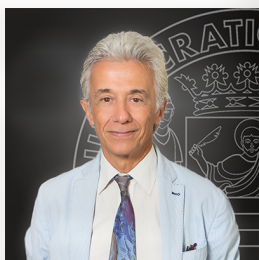
DIPARTIMENTO DI SCIENZE E TECNOLOGIE

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Piano Nazionale
Lauree Scientifiche

GIORNATE SCIENTIFICHE DEL DST



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Nanoporous crystalline polymers and environmental, food packaging and antimicrobial applications

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Sala Riunioni del DST

Via F. de Sanctis, Benevento

ABSTRACT

For two commercial thermoplastic polymers, syndiotactic polystyrene and poly(2,6-dimethyl-1,4-phenylene)oxide, crystalline phases including empty cavities of molecular size in their unit cell have been obtained and named nanoporous-crystalline phases. These nanoporous-crystalline phases exhibit density lower than the corresponding amorphous phases and are obtained by guest removal from co-crystalline host-guest phases, between a polymer host and low-molecular-mass guest.

Nanoporous-crystalline phases are able to absorb guest molecules also from very dilute solutions. Most studies have been devoted to syndiotactic polystyrene, which exhibits two different nanoporous-crystalline phases, whose nanoporosity is organized as isolated cavities and channels, respectively.

Physically crosslinked monolithic aerogels, whose physical knots are crystallites exhibiting a nanoporous crystalline form, will be also discussed. These aerogels present beside disordered amorphous micropores (typical of all aerogels) also all identical nanopores of the crystalline phases. Their outstanding guest transport properties combined with low material cost, robustness, durability and easy of handling and recycle make these aerogels suitable for applications in chemical separations, purification and storage.

Most of the presentation will be devoted to possible industrial innovations based on materials with co-crystalline and nanoporous crystalline syndiotactic polystyrene phases. In particular, applications of nanoporous films for active packaging of fruit and vegetable (by removal of ethylene and carbon dioxide), of nanoporous staple for removal of pollutants from water and air and of nanoporous aerogels as support for nanostructured catalysts, will be presented.