NEW POROUS ORGANO--HETEROSTRUCTURES BASED ON ORGANO-MODIFIED GRAPHENE-OXIDE

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ABSTRACT

Graphene Oxide (GO), has been identified as an excellent host matrix for the accommodation of a plethora of molecular structures for the fabrication of hybrid materials for energy[1] environmental[2] and sorption[3] applications. In this work, highly porous heterostructures with tailored properties were produced, through the silylation of organically modified GO. They can be effectively and efficiently obtained with only one silylation step, *i.e*. through a much faster method than previous reported in the literature[4]. In particular, three different organo-silica precursors with various structural characteristics (rendering alkyl or phenyl groups) were employed to create high-yield silica networks as pillars between the organo-modified GO layers. Phenyl group bridged samples showed the maximum amount of silica content in the final heterostructure. Subsequent pyrolysis created porous structures, with surface areas of up to 550 m^2/g, which are very attractive for potential CO_2 adsorption applications. Indeed, emission of CO_2 from energy intensive plants remains nowadays a major threat for global warming. To this end, the porous heterostructure that showed the maximum surface area was chosen for investigating its CO_2 adsorption properties. It was found to have a high CO_2 adsorption capacity of 2.8 mmol/g at 5 bar and 0 ^oC, which is promising for further consideration as CO_2 storage material that combines the properties of graphene with the very high porosity of silica.

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