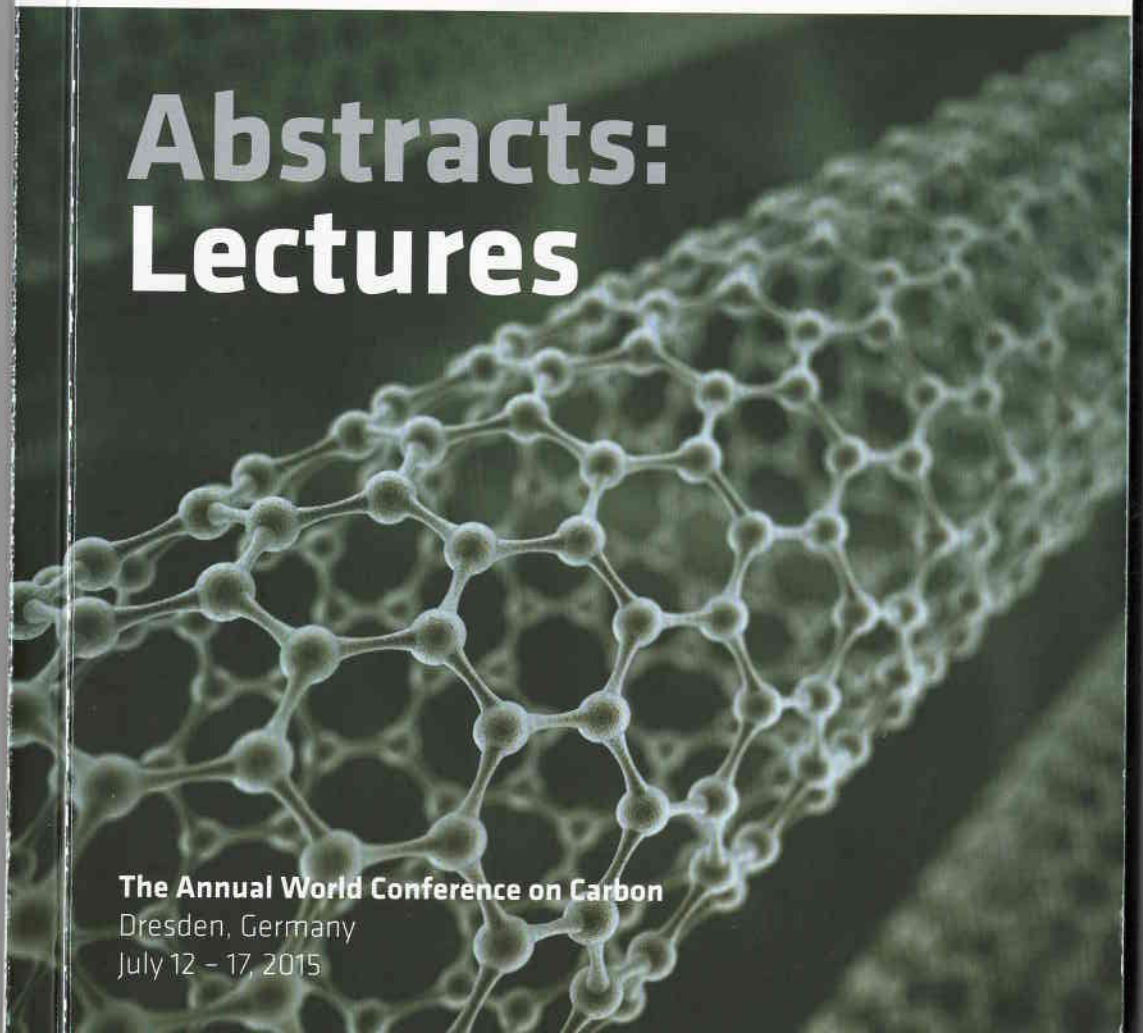
CARBON 2015

INNOVATION WITH
CARBON MATERIALS

Abstracts: Lectures



The Annual World Conference on Carbon
Dresden, Germany
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Microwave Plasma Enhanced CVD graphene-based aerogels: synthesis and study

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Nanoforms of Carbon

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Most of the reported carbon nanomaterial aerogel are based on carbon fibers, carbon nanotubes, or reduced graphene oxide. Recently, highly uniform graphene nano-platelets, which is about 2 atomic layers thick and functional group free, have been synthesized using microwave plasma enhanced CVD. A BET surface area as high as 2039 m^2/g has been achieved. Aqueous dispersion of microwave plasma enhanced CVD graphene platelets is achieved using chitosan as the agent. The samples are first freeze-dried, then stabilized by heating in inert gas to 800°C. The resulting aerogels are 3D porous systems, where chitosan forms mechanically strong matrix and the graphene platelets enhance porosity as well as increasing the hydrophobicity of aerogel.
SEM photos show that the aerogel is highly porous with the average pore size ranges from 2 to 14 microns. The surface is highly hydrophobic and the contact angle of the aerogel surface with the water drop is larger than 160°.
Sorption capacity of microwave plasma enhanced CVD graphene-based aerogels was measured. It was found that 1 gram of aerogel can absorb 101.3 grams and 99.3 grams of diesel and pump oil, respectively.

Light-assisted synthesis of ordered carbon m

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A green, simple and rapid novel approach to synthesize ordered porous carbon is reported here along with their formation mechanism. This is based on simple light exposure of a solution of carbon polymer precursors and a soft-template for a short period of times followed by carbonization. No thermopolymerization step is required by this approach compared to classical pathway, the cross-linking being induced by light. The influence of benzophenone photosensitizer on the formation of phenolic resin and carbon characteristics was studied in details. The benzophenone accelerates several times the reaction rate modifying mainly the phenolic-resin structure (higher degree of cross-linking and carbonization) via radical formation as sustained by Raman and ^{13}C solid state NMR spectroscopy. Benzophenone also induces modification of carbon morphology from a worm-like disordered to a highly organized hexagonal one due to the different micellar structuration of the template in the presence of benzophenone as demonstrated by ^{1}H solid state and relaxation NMR analysis. The proposed synthesis pathway allows as well to obtain metal particles embedded in carbon by a direct strategy.