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Nanocellulose as a environmentally friendly source for hierarchical  
porous graphite network with SPS

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## **Abstract**

Porous carbon is very common and popular material in different applications. Depending on the pore size, the porous carbon materials are used for gas separation, water purification, catalyst supports, and electrodes for electrochemical double layer capacitors and fuel cells, and as molecular sieves. [1] A common method of preparing porous carbon is template method and using precursor polymers, which are graphitized with heat treatment followed by the template removal. Common template materials are silica and zeolites; given possibility to tailor the pore size and distribution. The polymers are often used as precursor and in the need of greener source for carbon; nanocellulose should be a good choice.

In this study, a direct formation of carbon network in SPS from nanocellulose was investigated. Silica nanoparticles were used as a template to form meso and macrosized porosity with the walls created by carbonized nanocellulose. Two types of nanocellulose was used as a source of carbon in a mixture of nanocellulose and silica. The composite was sintered with SPS, and the silica was removed by etching afterwards to reveal the carbon network. The gained structures were characterized with SEM, Raman, and TEM. Plain nanocellulose was also sintered in SPS at the similar conditions as the composites. In order to distinguish if there is any advantage of SPS in the preparation of monolithic; same materials were sintered in a protective atmosphere.

[1] J. Lee, J. Kim, and T. Hyeon ; Adv. Mater. 2006, 18, 2073–209;

## **Keywords**

Nanocellulose, nanosilica, carbon network