# Activated carbon fiber as a quantum dots matrix

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Activated carbon fibers (ACF) are the example of porous carbon structures made of nanoparticles of quasi-graphitic system. Such structures exhibit peculiar electrical transport properties with quantum effects resulting from size and specific connections between the nanoparticles.

Localization of spins within nanographitic units of ACF was described by the model which is a fusion of two approaches: Curie-law behaviour studied by EPR and granular metal model [1]. Our model correlates with the Coulomb-gap variable-range hopping approach (CGVRH), characteristic of charge transport in granular systems [2] and is confirmed by the pulsed electron spin resonance measurements [3].

Adsorption of various molecules in ACF's porous system significantly influences the electronic and structural properties of the carbon nanoparticles system. Strong changes in spin localization processes are observed when potential barriers for hopping of charge carriers are modified by guest molecules [3,4]. The strongest changes are observed in case of water and nitrobenzene adsorption. These dipolar molecules influence the electric transport as well as the structure of the nanoparticles building ACF [4]. Potential barriers modifications generated by the host-guest interaction enable to observe the Coulom-gap opening in this system [5]. The dipolar molecules controlled by the external electric field also enable to steer the electric transport in described system of quasi-graphitic particles which can be treated as a quantum dots matrix.

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