# Chemical Modified Nanodiamonds: Synthesis and Properties

Kulakova I.I.

*Lomonosov Moscow State University, Moscow, Russia*
*E-mail: kulakova@petrol.chem.msu.ru*

Chemical modification of nanodiamond (ND) allows to change meaningly physico-chemical properties of their surface and to have materials with necessary properties, to regulate adsorptive and adhesion characteristics of these materials, to alter their dispersibility, thus enhancing their practical application field, to create brand-new materials, including ones for biomedicinal purposes (for directional drugs delivery *in vivo*), chromatographic sorbents for HELC (e.g. based on the porous dispersed diamond - PDD), as well as for other modern technologies.

ND surface modification by means of the covalent grafting is of the most interest. The peculiarity of the produced material consists of the combination of mechanical, termal, radiation and chemical stabilities of diamond and the lability of the grafted layer.

In this presentation, I will discuss syntheses of different chemically modified ND with grafted hydrocarbon layers ($CH_3$-, *n*-$C_4H_9$-, *n*-$C_6H_{13}$-, *n*-$C_{16}H_{33}$-, n-$C_{18}H_{37}$-HA, *cyc*-$C_6H_{11}$-, $C_6H_5$-), with grafted acylic groups ($CH_3CO$-, $C_2H_5CO$-, $C_3H_7CO$-, *n*-$C_7H_{15}CO$-, *n*-$C_{17}H_{35}CO$-HA) et al, as well as *n*-$C_{16}H_{33}$-PDD. Here I will also present study results of ND particles structure, composition and structure of grafted layers based on data of physical and physicochemical methods (ESR, NSR-$^1$H, electronic and optical spectroscopy et al). There is no non-diamond carbon on the particles surface of examined initial and modified ND and PDD. The modification process has no effect on the thickness of destroyed carbon shell. As shown by spin resonance spectroscopy, chemical modification of ND surface and air treatment have no impact on the ***g***-factor (2,0021±0,0001), the shape of a spectral line and a concentration of paramagnetic centers (~10 spin/particle). That allowed to make a decision on the localization of paramagnetic centers inside the particles, but not on their surface.

It was studied for the first time the sorption and chromatographic properties of modified PDD (adsorption isotherms, Henry constants, thermodynamic characteristics of adsorption, impact of the specific interactions) by means of gas and liquid chromatography. It was shown that the number of the adsorption centers, responsible for nonspecific interactions, is equal on the surface of specimens H-PDD and *n*-$C_{16}H_{33}$-PDD, though specific interactions are more typical for PDD-H. A sorbent with a grafted layer of *n*-$C_{16}H_{33}$ -groups is stable in high alkaline media.