



Metallization and functionalization of diamondoids and their applications

The thesis deals with development of synthetic methods for preparation of novel carbon-metal organohybrid based on diamondoid and palladium.

The vapor pressure of various diamondoids was measured from a new measurement protocol at solid-vapor thermodynamic equilibrium state. Their volatile tendency opened a possibility to do deposition from gas phase and at various pressure (ambient, primary vacuum, and high vacuum) of diamondoids on silicon or mica substrates. SEM observations have shown that depending on the type of functional groups on the diamondoid, different crystal shapes can be produced (rods, needles, triangles, truncated octahedral form).

OMCVD of palladium on functionalized diamantanes showed that Pd deposition occurs preferentially on the oxide native layer on silicon substrates than on diamondoid crystals bearing hydroxyl or fluorine groups. This urged the synthesis new diamondoids with phosphino groups in order to make strong covalent bonding between the modified diamondoid and palladium.

A full set of functionalized diamondoid phosphines were synthesized with unexpected air-stability of some primary diamondoid phosphines were observed.

It has been shown that the use of P(III) phosphine as anchoring sites allowed the formation of hybrid material **Pd@PH₂-Diam-OH**. Different characterizations (XPS, SEM, TEM, and EDX) indicated that an insulator material **Pd@PH₂-Diam-OH** formed during the CVD deposition with P-Pd interaction.