Allotropic forms of carbon are extremely interesting objects of research for scientists from all over the world, what is supported by recent - known probably to everybody – advances on graphene. Apart from the most popular forms of carbon i.e. diamond and graphite, there is many more, some of which are presented in Figure 1.

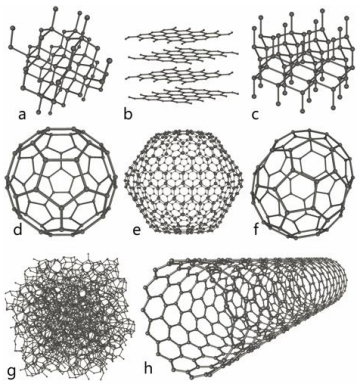

Figure 1. Selected forms of carbon: a) diamond, b) graphite, c) lonsdaleit, d) C_{60}, e) C_{540}, f) C_{70}, g) amorphic carbon, h) SW nanotube (source: Wikipedia).

Presented in the research proposal polyyne compounds belong to the group of so called carbon rich compounds and polyynes with long carbon chains are models for yet unknown allotropic form of carbon - carbyne, in which all carbon atom possess sp hybridization.

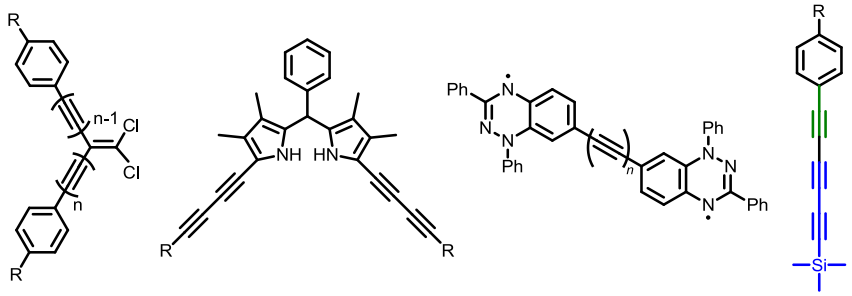

Figure 2. Carbon rich polyyne compounds presented in the research proposal.

Polyyne compounds can have different structure and conformation of the carbon chain can significantly fluctuate varying its shape from linear through symmetrical or unsymmetrical bow to S-shape, what is presented in Figure 3. Polyyne compounds can also have a shape of a circle, which can occur in two forms: conjugated and cumulenic. In the later, only one bond type (double bond) is present and it links each two carbon atoms.

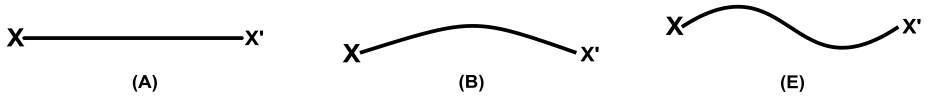

Figure 3. Polyyne chain conformations: linear (A), symmetrical bow (B) and S-shape (C).

New discoveries show, that polyyne compounds can also have a great application potential and can be used in nanoscale electronics as molecular wires and switches.