**Laser Ablation Synthesis of Carbon-Phosphide Clusters – a Way Towards C-P Polymers**

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Recently, carbon-phosphide (C-P) polymers are coming to scene. They can be synthesized e.g. via plasma deposition from CH4 and PH3 gas mixture.1 The C-P polymer found already application in optoelectronics2 and C-P nano-composites in lithium and sodium batteries.3, 4

In this work, we studied the generation of carbon-phosphide C*m*P*n*±clusters via laser ablation of several nano-composites of nanodiamonds (ND) or graphene (G), with red or black phosphorus (RP or BP) or phosphorene: ND-phosphorene, ND-RP, ND-BP, G-RP, G-BP, etc.) using pulsed laser (337 nm) in a mass spectrometer as a kind of synthesizer. All nano-composites used in the study were characterized by electron microscopy. Phosphorene was prepared by liquid exfoliation from black phosphorus in N-methyl-2-pyrrolidone solvent using ultrasonication.5 We demonstrated generation of several series of C*m*P*n*+ cluster ions: C*m*P+ (*m*=3–47), C*m*P2+ (*m*=2–44), C*m*P3+ (*m*=1–42), C*m*P4+ (*m*=1–39), C*m*P5+ (*m*=1–37), C*m*P6+ (*m*=1–34), C*m*P7+ (*m*=1–31), C*m*P8+ (*m*=1–29), C*m*P9+ (*m*=1–26), C*m*P10+ (*m*=1–24), C*m*P11+ (*m*=1–21), and C*m*P12+ (*m*=1–19) clusters were detected. LDI of nanodiamond composites with red/black phosphorus or with phosphorene yielded C24P5+2*n*+ (*n*=0–28), C24P5+2*n*+ (*n*=0–16), and C24P5+2*n*+(*n*=0–14), respectively. Dominant clusters with the highest intensities were C7P+, C6P3+, C10P3+, and C13P5+,while graphene was evaluated as the most suitable precursor for C-P clusters generation. The results of this work were recently published.6

Concluding, in total, over 300 new carbon–phosphide clusters were generated. These results are opening the possibility to produce polymeric C-P monolayers via pulsed laser deposition with wide range of potential applications.

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