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XV International Symposium on Self-Propagating High-Temperature Synthesis

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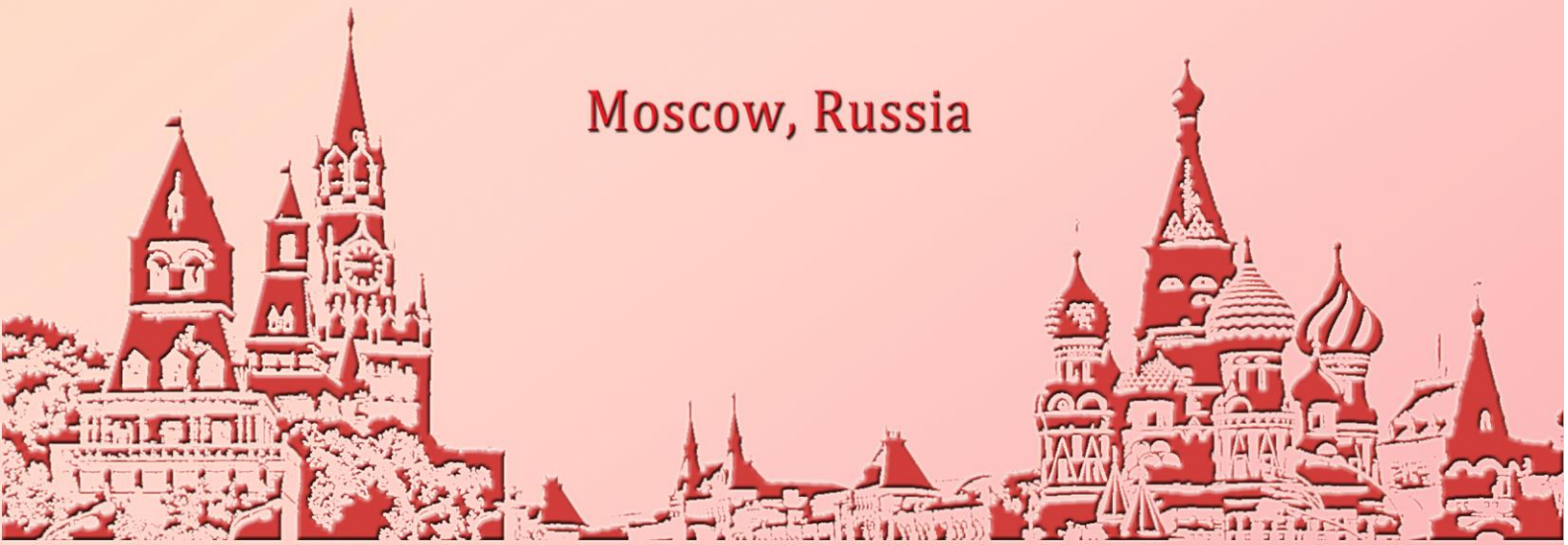
Moscow, Russia



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SYNTHESIS AND CHARACTERIZATION OF BN/Pt AND BN/Au NANOHYBRIDS AS PERSPECTIVE CATALYSTS

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For several years BN nanostructures attracted a great attention from material science community as perspective material for various applications in catalysis, drug delivery, tribology and structural materials. Such a wide range of applications is associated with its unique combination of physical and chemical properties, such as low specific density, high thermal stability, oxidation resistance, excellent dispersion stability and transparency, enhanced adsorbing capacity, and a wide band gap [1]. Here we report synthesis and characterization of BN/Pt and BN/Au nanohybrids as perspective catalysts.

Hexagonal BN (h-BN) nanoparticles were synthesized by CVD method using FeO, MgO, SnO, H_3BO_3, and B precursors and various Ar and NH_3 gas flow rates. The synthesis temperature was 1200–1300°C [2]. BN/Au hybrids were synthesized by chemical deposition method from gold chloride acid solution in polyethylene glycol. BN/Pt hybrids were obtained by chemical deposition from platinum hydrochloric acid solution flowed by reduction in hydrogen flow at T = 350°C.

Nanohybrids were analyzed by scanning and transmission electron microscopy using JSM7600F and JEM 2100 instruments (Jeol Ltd.).

The synthesized BN particles had external dimension 80–150 nm. Immobilized agents had average size less than 10 nm (Figs. 1, 2).

Catalytic properties of BN/Au and BN/Pt systems were investigated toward carbon monoxide (CO) oxidation. The best results were obtained for the BN/Pt catalyst: the onset and full conversion temperatures were 154 and 184°C, respectively.

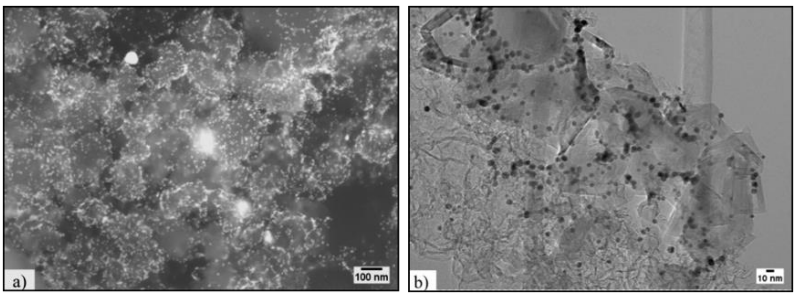

Fig. 1. SEM (a) and TEM (b) images of BN/Au hybrid nanoparticles.

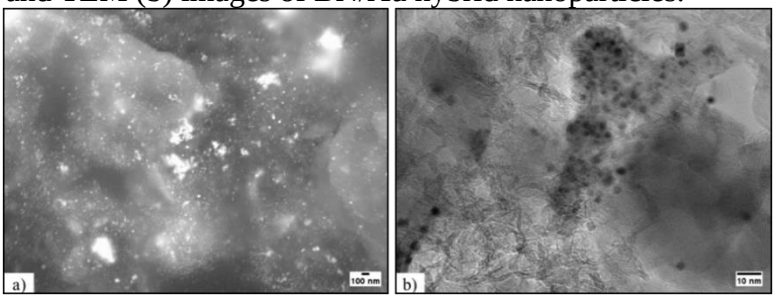

Fig. 2. SEM (a) and TEM (b) images of BN/Pt hybrid nanoparticles.

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Self-Propagating High-Temperature Synthesis

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