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A combined experimental and computational study on the catalytic effect of aluminum nitride nanocrystal (AlN) on the polymerization of benzene, naphthalene, anthracene, phenanthrene, chrysene and tetracene

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Different approaches have already been developed in the literatures for the preparation of Aluminum Nitride Nanocrystal (AlN) including sol–gel method, hydrothermal, ultrasonic, aerosol, micro–emulsion, solid state reaction, spray pyrolysis, Chemical Vapor Deposition (CVD) methods, carbothermal reduction processing, thermal plasma processing and so on. The products were identified by Energy Dispersion Analysis (EDS), Scanning Electron Microscope (SEM), X–Ray Diffraction (XRD), Transmission Electron Microscope (TEM), Differential Thermal Analysis–Thermal Gravim Analysis (DTA–TGA), Energy–Dispersive X–Ray Spectroscopy (EDX), ^{1}HNMR, ^{13}CNMR, ^{31}PNMR, UV–Vis, Attenuated Total Reflectance Fourier Transform Infrared Spectroscopy (ATR–FTIR) and FT–Raman spectroscopies and also ESI MS, PM5 and DFT studies. Experimental and computational results showed that pore size of the Aluminum Nitride Nanocrystal (AlN) was 50–70 (nm) when calcinated at 1085°C (Figures 1 and 2) [1-212].

On the other hand, Aluminum Nitride Nanocrystal (AlN) is mixture of hexagonal and cubic structures. Aluminum Nitride Nanocrystal (AlN) indicates attractive properties such as high thermal conductivity, wide band gap, low thermal expansion coefficient, high electric resistance, relatively low dielectric constant, excellent chemical and mechanical stability. Also, that is non–toxicity. Aluminum Nitride Nanocrystal (AlN) inhabits attractive luminescence property. Because of these important properties, it can be widely used as electronic substrates, protective coating, optoelectronic parts, heat skins, cutting tools, high–power chips and filler for polymer and glass materials. One important property of Aluminium Nitride Nanocrystal (AlN) is catalytic effect on the polymerization of benzene, naphthalene, anthracene, phenanthrene, chrysene and tetracene. Aluminum Nitride Nanocrystal (AlN) synthesized with different methods such as sol–gel method, hydrothermal, ultrasonic, aerosol, micro–emulsion, solid state reaction, spray pyrolysis, Chemical Vapor Deposition (CVD) methods, carbothermal reduction processing, thermal plasma processing and so on. The sample analyzed by Energy Dispersion Analysis (EDS), Scanning Electron Microscope (SEM), X–Ray Diffraction (XRD), Transmission Electron Microscope (TEM), Differential Thermal Analysis–Thermal Gravim Analysis (DTA–TGA), Energy–Dispersive

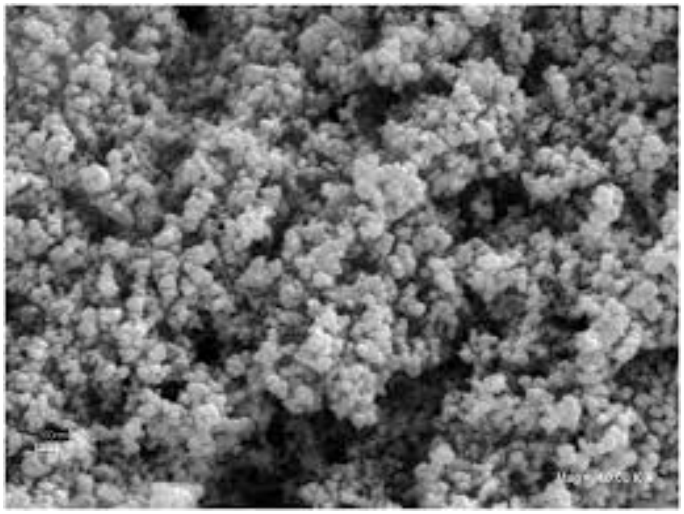

Figure 1. Scanning Electron Microscope (SEM) image of Aluminum Nitride Nanocrystal (AlN) with 250000x

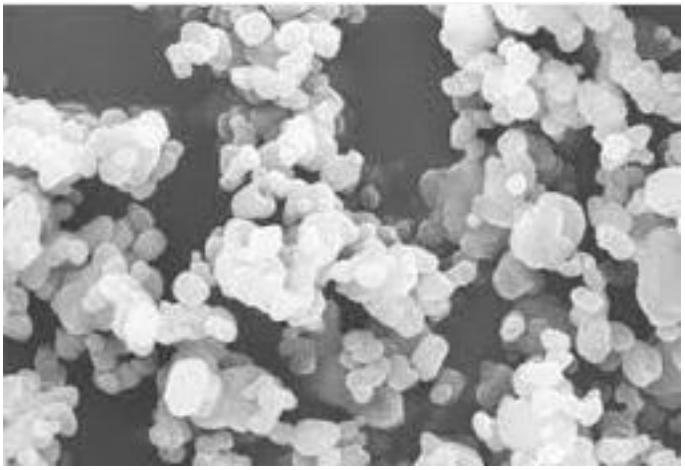

Figure 2. Transmission Electron Microscopy (TEM) image of Aluminum Nitride Nanocrystal (AlN) with 250000x zoom

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X–Ray Spectroscopy (EDX), ^{1}HNMR, ^{13}CNMR, ^{31}PNMR, UV–Vis, Attenuated Total Reflectance Fourier Transform Infrared Spectroscopy (ATR–FTIR) and FT–Raman spectroscopies and also ESI MS, PM5 and DFT studies.

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