

[10.14233/ajmc.2018.AJMC-P56](https://doi.org/10.14233/ajmc.2018.AJMC-P56)**Polymer Nanocomposites Based on Graphene and Titanium Oxide for Supercapacitors**Abdullah Saleem Khazaal[✉]

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A nanomaterials graphene and titanium oxide (TiO₂) have been prepared and characterized by IR, atomic force microscopy (AFM) and X-ray diffraction. The different thin films of mixed poly(vinyl alcohol) and polyacrylamide, polymers/nano TiO₂ and polymers/ nano(graphene + titanium oxide) have been prepared and their electrical properties (real and imaginary electrical isolation constants and conductivity) were examined at different frequencies. A super capacitors based on polymer mixtures and polymers mixture with nanomaterials have been prepared and their voltages examined at charging and at different intervals of time (5, 10, 15 and 30 min and 1, 5, 10, 15, 20 and 24 h). The best capacitor was of polymer mixture/nano(graphene + TiO₂), which is attributed due to the good conductive properties of graphene.

Keywords: Super capacitors, Graphene, Titanium oxide, Electrical properties.

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Boron Promoted on Crystallization and Microstructure of Strontium Containing Mica Glass-Ceramics

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The process of nucleation and crystallization of $\text{SrO}\cdot 4\text{MgO}\cdot \text{Al}_2\text{O}_3\cdot 6\text{SiO}_2\cdot 2\text{MgF}_2$ glasses with B_2O_3 as nucleating agent were characterized by differential thermal analysis, X-ray diffraction and scanning electron microscopy. A number of glass-ceramics of each glass batch with excess B_2O_3 [SR2 (2 % B_2O_3), SR4 (4 % B_2O_3), SR6 (6 % B_2O_3) and SR8 (8 % B_2O_3)] were made by heating at its respective nucleation temperature followed by different ceramization temperatures (800-1000 °C). The analysis of DTA result indicated that the crystallization peak (T_p) and glass transition (T_g) temperatures decreased with increasing B_2O_3 content. It was also found that the higher B_2O_3 content, the higher the aspect ratio of fluorphlogopite crystal.

Keywords: Glass, Ceramics, Nucleation, Crystallization, Microstructure.

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Physico-chemical Properties of Fine Powders of Copper Obtained by Electrochemical Synthesis

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The possibility of electroprecipitation of copper powder *via* cathodic reduction of an electrolyte solution containing copper(II) nitrate and dimethyl sulfoxide is reported. The physico-chemical analysis of fine powder of copper received from water containing dimethyl sulfoxide solutions is conducted. Particle sizes of the copper powder are defined by a submicroscopy. The qualitative composition of copper powder is determined by results of radiographic and thermogravimetric techniques. By results of physico-chemical properties of fine copper powders prepared by an electrochemical cathodic deposition it is established that the anode material practically does not influence, their chemical composition and dimensional characteristics.

Keywords: Dimethyl sulfoxide, Copper powder, Electrolysis, Thermogravimetry.

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Thermal Studies on Chain Extended Bismaleimides-II

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4,4'-Bismaleimidodiphenyl methane (BMIM) was synthesized by chemical imidization. Using three different aromatic diamines (4,4'-diaminodi-phenyl ether (E), 4,4'-diaminodiphenyl methane (M) and 4,4'-diamino-diphenyl sulfone (S)) chain extended BMIM were prepared. The scope of present work is to study the curing and degradation studies of different chain extended BMIM resins using differential scanning calorimeter (DSC), thermogravimetric analysis (TGA) and differential thermogravimetry (DTG). Kissinger-Akahira-Sunose (KAS), Flynn-Wall-Ozawa (FWO) and Friedman (FRD) methods were followed to calculate apparent activation energy for curing and degradation studies. Exothermic transition indicative of curing was observed in DSC traces in the temperature range of 50-450 °C. Melting point and also the amount of heat released during thermal curing was considerably reduced in the chain extended BMIM. The initiation of curing reactions at temperature lower than pure BMIM's melting point can be easily identified by the non-presence of melting peak in the chain extended BMIM. The apparent activation energy values for the thermal degradation of the chain extended bismaleimides are significantly reduced compared to pure BMIM. From this, it is concluded that the chain extension using (4,4'-diamino-diphenyl ether, 4,4'-diaminodiphenyl methane and 4,4'-diamino-diphenyl sulfone) plays an important role in pure BMIM degradation mechanism. Char yield was not significantly affected when pure bismaleimides were extended by aromatic diamines.

Keywords: Bismaleimides, Chain extension, Thermal analysis, Curing kinetics, Degradation kinetics.

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Synthesis and Influence of Feret Diameter on Particle Morphology of Activated Carbon Derived from Agrowastes

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In this work, activated carbon was produced by chemical activation with phosphoric acid of agricultural wastes such as Arecanut shell of 180 mesh. Activated carbon is produced at activation temperature of 400 °C by slow pyrolysis. The BET surface area and iodine number surface area was calculated and compared. The FTIR spectrum showed the presence of activated carbon. Thermogravimetric analysis revealed that the activated carbon is thermally stable at 480 °C. The SEM images showed the incorporation of activated carbon particles. Surface area plot shows the details of morphological change caused by feret diameter on iodine number surface area, iodine number, methylene blue number and acid adsorption value. These results proves that the feret diameter plays important role in selection of final activation temperature and impregnation ratio, and also important in determining the quality of activated carbon obtained.

Keywords: Arecanut shell, Activated carbon, Phosphoric acid, Feret diameter.

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Preparation of Cypermethrin Loaded PLGA/PVA Nanoparticles as Medical Vector Control

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In this work, a copoly(lactic/glycolic)/cypermethrin nanoparticles was synthesized. A delivery system of insecticides induces active ingredient having desirable for pest control. The developed cypermethrin nanoparticles were then characterized by a UV-visible spectrophotometer, DLS and transmission electron microscope, proved that the spherical, medium sized (230-340 nm). This nanoparticles may be an efficient candidate as a insecticide for control cockroach after the biological study which is in progress.

Keywords: Nanopesticide, Cypermethrin, Polylactic acid glycolide, Pesticides, Emulsion.