European Journal of
Applied Engineering and Scientific Research

Abstract

Polysaccharides Nanocomposites with Ca2+ and their Multifunctional Applications

Farid Khan

Nanomaterials Discovery Lab. Department of Chemistry Dr. H. S. Gour Central University SAGAR- 470 003(M.P.)

Abstract:

Energy of activation(Ea), and thermodynamic parameters such as enthalpy (ΔH#) and entropy(ΔS#) were determined by Arrhenius's equation and Eyring equation48 respectively. The value of Gibbs free energy (ΔG#) was determined by the relation as ΔG# = ΔH# - TΔS#

The activation energy(Ea) for catalyst Alg/CMC/Dex/MnO2/g-C3N4/Ca is 21.56 kJ mol-1(Fig. S1) which confirms the reduction reaction is slow and surface controlled on catalyst surface. The value of enthalpy (ΔH#) is 7.46 kJmol-1(Fig.11) suggests that the reaction needs energy. The value of Gibbs free energy (ΔG#) increases from 56.352 to 59.634 kJmol-1 with increase of temperature confirmed that the reduction of Cr(VI) to Cr(III) required energy.The value of entropy(ΔS#) is -16.425Jmol-1K-1 at suggests that the reaction is feasible at higher temperature. 49 The temperature coefficient is 1.158 & 1.113 attributing the reaction is favorable at higher scale origin of plastic crystals with CBCEs and provides important guidance to the design of next-generation solid-state refrigeration technology for practical application. In the fabrication of electrode, the composition of graphite powder, nanocomposite with pasting liquid (paraffin oil) strongly affects the reactivity of electrode. The increase in the amount of pasting liquid decreases electron transfer rates as well as the background current contributions.37-38 The optimum amount of Alg/CMC/Dex/MnO2/g- C3N4/Ca nanocomposite mixed with graphite powder to fabricate Alg/CMC/Dex/MnO2/g-C3N4/Ca/CPE was achieved by varying the amount of Alg/CMC/Dex/MnO2/g-C3N4/Ca from 5% to 20% (w/w) in total paste material and their peak response were analysed by recording differential pulse voltammogram (DPV) of 1.0×10-6 molL-1 K2Cr2O7 in acetate buffer pH 5.5. The best electrode response was obtained with 15% (w/w) of nanocomposite 60% (w/w) graphite powder and 25% (w/w) paraffin oil. Similarly in case of Alg/CMC/Dex/Ca/CPE and Alg/CMC/Dex/MnO2/Ca/CPE, 15% (w/w) of Alg/CMC/Dex/Ca and Alg/CMC/Dex/MnO2/Ca in total paste material shows the best peak response for 1.0×10-6 mol L-1 K2Cr2O7.

Biography:

Prof. Farid Khan's research group is working on nanoporous materials of silver, gold, titanium oxides, copper oxides, nickel, cobalt, zinc, palladium and rhenium using ionic and non-ionic

surfactants by modified sol-gel method. Porous morphology has also been made by dissipative convective phenomena followed by freeze drying method. Tuning the pore for diverse applications is a greater challenge which has been achieved by structural directing agents and reinforcing agents such as CNT, GO, rGO, and nanoparticles such as TiO2, Au, Si, Fe and Ag in-situ and ex-situ synthesis.

Publication of speakers:

- M. Thomas, T. S. Natarajan, M.U. D. Sheikh, M. Bano, F. Khan, Self-organized graphene oxide and TiO2 nanoparticles incorporated alginate/carboxymethyl cellulose nanocomposites with efficient photocatalytic activity under direct sunlight. J. Photochem. Photobiol. A: Chem. 2017 (Accepted manuscript) (IF-2.5).
- M. Thomas, M. U. D. Sheikh, D. Ahirwar, M. Bano, F. Khan, Gold nanoparticle and graphene oxide incorporated strontium crosslinked alginate/carboxymethyl cellulose composites for o-nitroaniline reduction and Suzuki-Miyaura cross-coupling reactions, J.Colloid and Interface Sci. 505 (2017) 115-129 [IF-3.78].
- M. Bano, D. Ahirwar, M. Thomas, M. U. D. Sheikh, and F. Khan, Hierarchical porous silver metal using Pluronic F-127 and grapheme oxide as reinforcing agents for the reduction of o-niroaniline to 1,2 benzenediamine. J. Solid State Chem.248 (2017) 40-50 (IF-2.6).
- M. U. D. Sheikh, G. A. Naikoo, M. Thomas, M. Bano, D. Ahirwar, U. J. Pandit and F. Khan,'Fabrication of hierarchically mesoporous CuO nanostructures & their role as heterogeneous catalysts & Sensors' RSC Adv.6 (2016) 42807-42818 (IF-3.28).

Webinar on Applied Materials, December 30th, 2020; Dubai, UAE.

Citation: Hui Wang; Polysaccharides Nanocomposites with Ca2+ and their Multifunctional Applications; Applied Materials-2020; December 30th ; Dubai, UAE.