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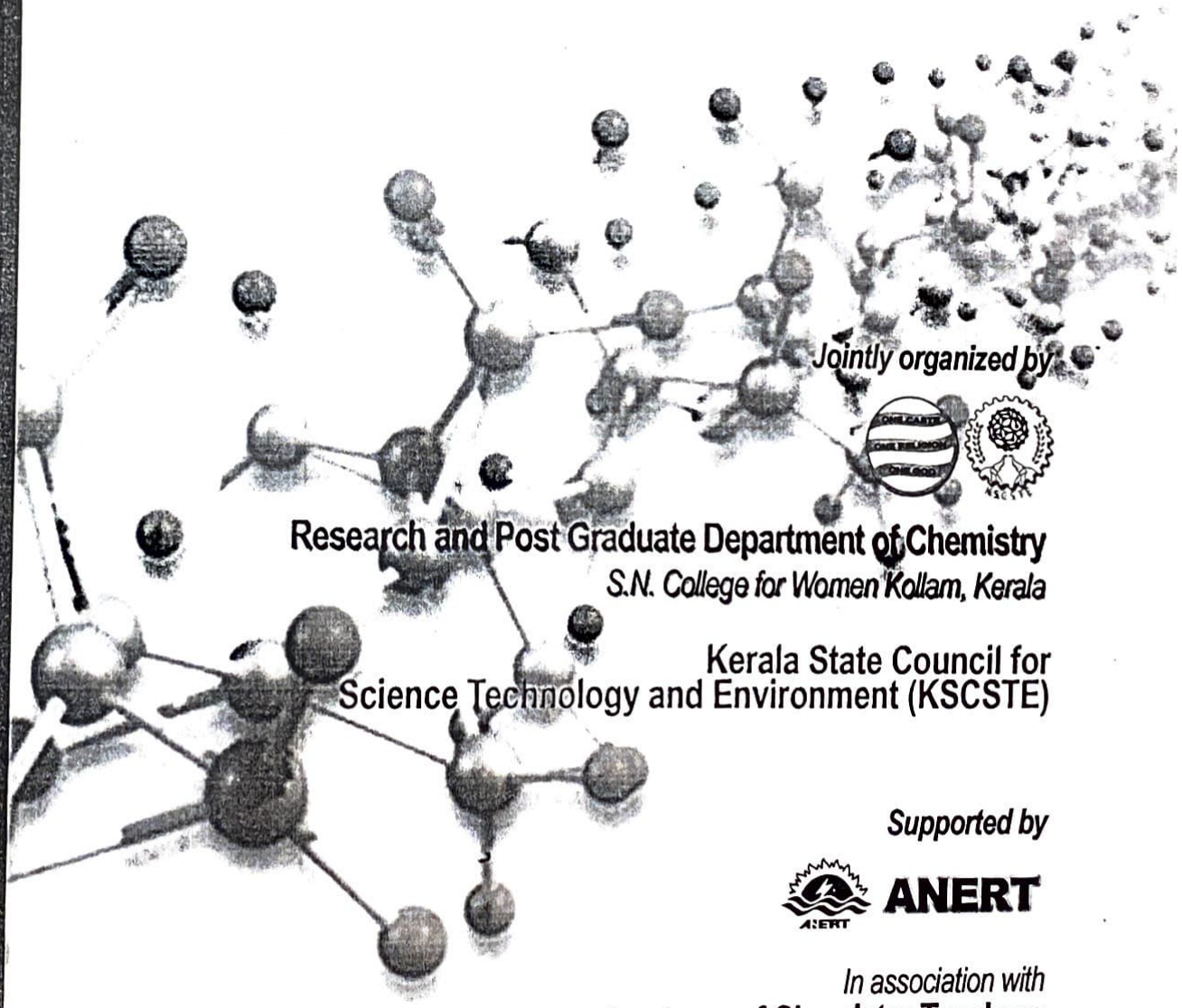

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PROCEEDINGS

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Synthesis and electrochemical applications of functionalized graphene with bimetallic Pt based Nanoparticles for electrocatalytic water reduction

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ABSTRACT

The utilization of earth-abundant non-precious metal catalysts for the making of new generation electrochemical devices which can provide a safe, clean and sustainable hydrogen based energy system, because hydrogen as carbon-neutral energy vector which is pivotal for most of the energy demand technologies such as fuel cell for generators and engines, fertilizer industry, hydrocarbon productions. Hydrogen production through a greener and safer technology was needed to reduce CO_2 reduction for environmental remediation. The bi- or tri-metallic surface configuration modifies the (Hydrogen binding energy) HBE such that Pd/Pt and Pd/Ru surfaces show one order of magnitude enhancement of the exchange current density over monometallic catalysts in alkaline or acidic medium. It is therefore critical to investigate the HER/HOR in an alkaline environment in order to obtain a fundamental understanding and to develop more efficient electrocatalysts. For this purpose, a new novel strategy can be envisaged to design a bimetallic Pt based nanomaterials on efficient graphene oxide which offers selective water dissociation, proton reduction and followed by electron translocation. To satisfy the demands, 3D graphene oxides was employed as the prominent materials because of its large surface area, electrical conductivity and stability to wide pH conditions.

Structural charecterization of the highly efficient GO supported electrocatalysts was done by using STEM and HRTEM analysis. The 3D structure integrated with oxide particles was however confirmed by FTIR analysis. The temperature dependant phase transformation and stability were evaluated by SAXRD and TG/DSC analysis. Electrocatalytic performance of HER was investigated by linear sweep voltametry (LSV) and chronoamperometry (CA) in deaerated buffer conditions under N_2 atmosphere. The HER kinetics at variable overpotential were evaluated using EIS analysis. The enhanced electrocatalytic activity and the kinetic behaviour of prepared catalyst were studied using Tafel polarisation curves.

Keywords: Eletrocatalyst, Water splitting reactions, Hydrogen evolution.