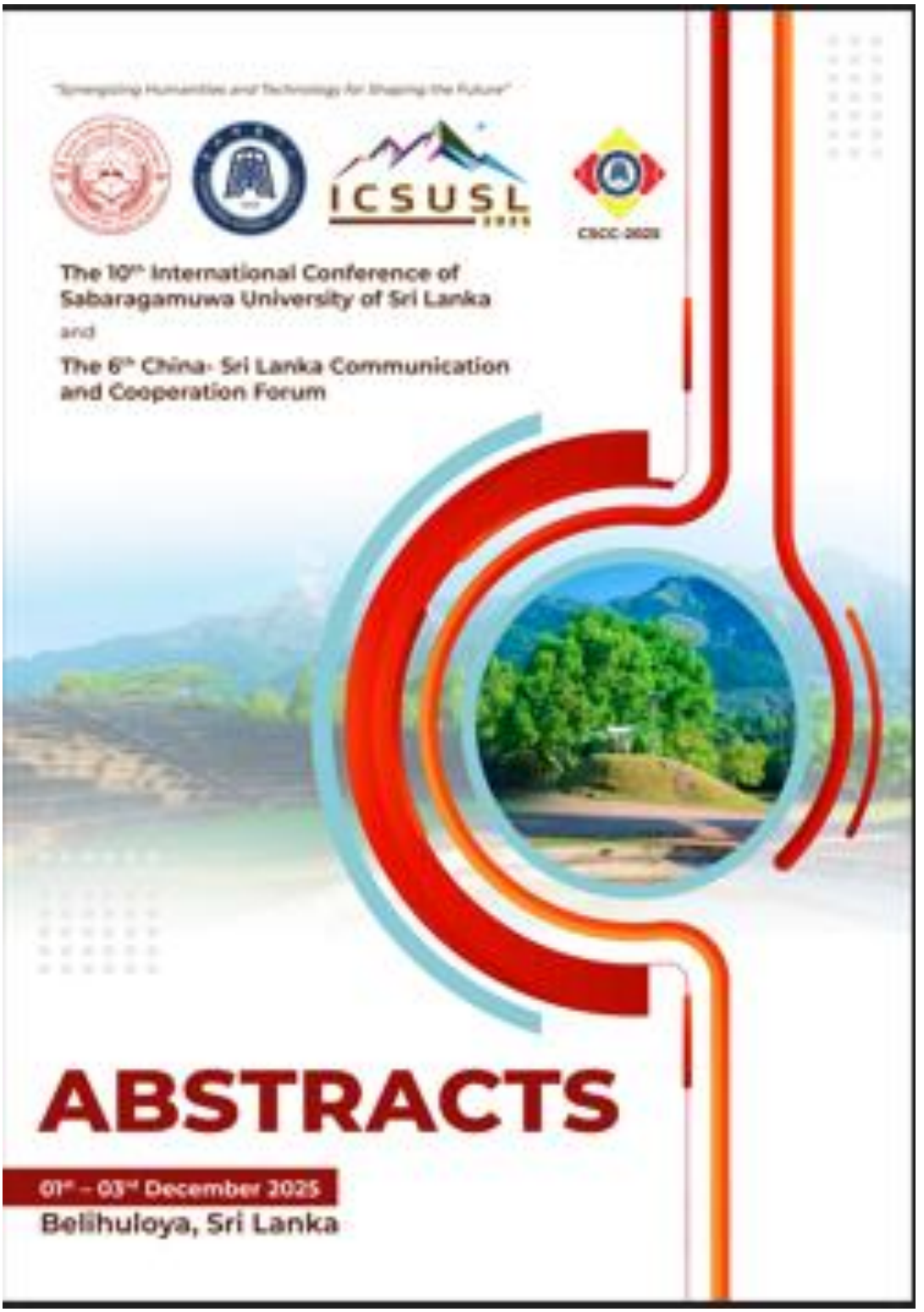
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ABSTRACTS
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A comparative study of activated carbon coating techniques on nickel foam current collectors

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In supercapacitor electrode fabrication, the active material loading technique directly influences the electrochemical performance of the device. In this study, the effect of three fabrication methods, Doctor Blade (DB), Drop Casting (DC), and Dip Coating (DP) electrode coating techniques, applied on the nickel foam substrates is examined. Coconut shell-derived Activated Carbon (AC) was loaded into a nickel foam (COL-INT-TECH, France) with a pore size of 0.25 mm and a thickness of 1 mm. AC powder (0.5 g) was combined with polyvinylpyrrolidone (PVP, 5 % w/w) as a binder and mixed with isopropanol as the solvent. In the DB method, a slurry was repeatedly spread over the substrate using a glass rod. In the DC method, slurry droplets were slowly deposited onto preheated foam at 150◦C for 5 minutes, and in the DP method, substrates were repeatedly immersed in the slurry. After loading the AC, all electrodes were annealed at 200◦C for 20 minutes. The cells were assembled symmetrically with a medium-retention filter paper as a separator and 1.0 M $KOH_{(aq)}$ as the electrolyte. Electrochemical performance was evaluated using cyclic voltammetry and galvanostatic charge discharge analysis in a two electrode system. Based on a direct comparison of the three methods, it is clear that the DC cell achieved the highest specific capacitance and areal capacitance of 17.06 F g^{-1}, 1.68 F cm^{-2}, followed by the DB cell with a 14.37 F g^{-1},1.52 F cm^{-2}, respectively. The DP cell showed the lowest values, with 11.69 F g^{-1} and 1.06 F cm^{-2}. The improved performance of the DC method can be attributed to better pore accessibility and stronger adhesion between the coated AC and nickel foam, which increases electron transport and ion diffusion. In contrast, DB and DP produced lower capacitance values due to non-uniform coatings and partial pore blockage from mechanical spreading or immersion. The results indicate that the electrode coating technique plays an important role in fabricating electrodes for supercapacitors. DC method, despite its simplicity, enables an effective active material coating technique and makes it a promising approach for laboratory scale fabrication of biomass-derived carbon electrodes in supercapacitors.

Keywords: *Dip Coating, Doctor Blade, Drop Casting, Nickel foam, Supercapacitor*