

# Studies on the Modification of Fly Ash structure with Alkaline Pre-treatment as a Green Composite Flame Retardant Filler

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**Abstract.** A green composite made up of renewable and recyclable materials has become one of the advanced material's attractive topics. The smooth fly ash surface used in the green composite for flame retardancy enhancement are hard to bind with hydrophobic polymer. Thus, the surface modification of this filler is needed to increase its surface roughness and pore size to be more compatible with its polymer matrix. In this research study, the alkaline pre-treatment of fly ash has been performed by using sodium hydroxide solution (NaOH) with various concentrations (5 w/w%, 10 w/w%, 15 w/w%, 20 w/w%). For pore size and morphological of the filler's evaluation, few analyses such as Scanning Electron Microscopy-Energy Dispersive X-Ray (SEM-EDX), Barret-Joyner-Halenda (BJH) and Brunauer-Emmett-Teller (BET) pore size and volume analysis were conducted. Treated fly ash with 20 w/w% sodium hydroxide concentration gives the better morphological structure in terms of pore diameter, volume, area and high composition of aluminium, silicon with lower calcium and sulphur contents compared to others. Hence, the potential of the physiochemical properties of the green composite produced by using this modified filler will be improved as the adhesiveness of the filler with its matrix increased.

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