APPLICATIONS OF FARADAY BUCKET

Harshal Gade[1], George Chase[1]

[1]University of Akron

Electro-spun polymeric nanofibers, can act as electrets in filtration applications when charged externally. Depending on the polymer material, may inherently exhibit stored electrical charges. One common issue is measurement of the amount of charge in a fiber mat. A custom-made Faraday's bucket was fabricated, and common protocol was laid for making such measurements. In this paper, applications of Faraday bucket have been discussed which includes effects of fiber morphology such as fiber diameter and basis weights on sample charge and detecting half-life of PVDF nanofibers when stored in various storage methods. Nanofiber samples of three diameters (150nm, 600nm ,1000nm) for five different basis weights (10,20,30,40,50 g/m2) were electro-spun and checked for surface charge using Faraday bucket. Samples were electro-spun at varying electrospinning parameters such as voltage (21, 24, 27 and 30 kV), flow rates (2, 5 and 8 ml/hr), collector to needle-tip distance (12, 15, 18.5, 22 cm) and rotation speeds (5, 45, 100 rpm) and checked for surface charge using Faraday's bucket. FTIR analysis was done to estimate the amount of beta-phase content for all the samples. As-spun and polarized PVDF nanofiber samples were kept in two storage methods such as open to air, light and in darkness with limited exposure to air and were run through Faraday bucket after regular intervals of time. FTIR analysis was done on stored as-spun and polarized samples obtained from same electro-spun sheet after regular intervals of time check any changes in beta-phase content.