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Electrical conductivity and EMI shielding application of high loft non- woven web from acrylic fibrous waste

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In recent years, research on electromagnetic interference (EMI) shielding materials has attracted significant attention due to increase in electromagnetic population from widespread applications of computer and telecommunication technologies [1, 2].For eco-friendly advancements in EMI shielding effectiveness,the development of new light weight shielding materials havingstrong absorption and weak secondary reflection is necessary. This can be achieved by porous morphology, large specific surface area and higher electrical conductivity of shielding materials [3,4].Although number of research studies focused on developmentof porous carbon based EMI shielding materials, the construction oflightweight structures with excellent EMI shielding properties bysimple and affordable method is still a big challenge. This workpresented the simple and novel method for preparation of porousand electrically conductive activated carbon nonwoven web fromacrylic fibrous wastes. The prepared activated carbon is advantageous over carbon made from other materials because of low cost,high density, better purity, and virtually dust-free nature of acrylicfibers [5].
The activated carbon web was prepared by sequentialaction of carding, thermal bonding with bi-component fibers and physical activation of acrylicfibrous web in presence of air. The carbonization was performedunder the layer of charcoal at 800 oC, 1000 oC and 1200 oC with theheating rate of 300 oC h-1 and without any holding time. Further,electrical conductivity, EDX, X-ray diffraction, SEM, X-ray tomography and BET analysis was carried out to study the effect ofcarbonization temperature on physical and morphological properties of activated carbon web. At the end, the electromagneticshielding ability of the produced three webs was investigated with
respect to change in carbonization temperature and thickness ofmaterial using two different measurement approaches (i.e. waveguide method and coaxial transmission line method).

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