Lamp Black Carbon Films: Supercapacitors of the Future

Kumar, Riddhi

Recent work by multiple researchers has demonstrated that two dimensional carbon graphene films can be used to fabricate supercapacitors. The unique existence of multiple solid allotropes of elemental carbon in lamp black raises the possibility of making similar devices with this type of carbon to store charge. This study investigated the hypothesis that elemental carbon films with high capacitance for use in energy storage devices such as supercapacitors can be obtained from lamp black deposits. A kerosene lamp was used to generate amorphous carbon lamp black soot. This soot was deposited onto 76 by 25 by 1 mm glass slides to which copper foil conductors were glued approximately 1 to 4 mm apart. The time of exposure and distance between the glass slide and the flame source were varied from 15 to 240 seconds and 10.16 to 17.78 cm respectively. The resistance and capacitance of the soot was measured using a multimeter. An LED-based device was constructed to depict and evaluate the charge storing ability of lamp black carbon film supercapacitors. The resistance and capacitance of lamp black carbon films studied was between 0.07 and18 M-Ohm and 0 to 60 nF respectively. The resistance and capacitance depended on distance and time from the flame. Moderate differences in deposit microstructure resulted in very different capacitance values. Lamp black carbon films succeeded in storing charge to light an LED for at least 0.05 second. Based on these results, it can be concluded that lamp black carbon films can store electrical charge.