Value Added Sensors from Environmental and Industrial Waste

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Solid waste is a huge problem in Qatar, it is produced as a rate of 2.5 Kg/day Out of this, polymers and carbon black constitute a significant percentage of it. This project aimed at synthesizing conductive polymer composites (CPC) force sensors utilizing two constitutes mentioned above. It is hoped that this approach will both help address the problem of waste and produce an economically and technically feasible sensor. The sensor was synthesized from a composite of two constituents: a filler material made of carbon black (CB) and a matrix material made of the polyethylene polymer (PP). Using CB as a filler to enhance electric conductivity and thermal stability. The filler material was formed using Ultrasonication method, and the electrodes were produced by applying conductive silver paste on both sides of the sensor. The work proceeded to test the effect of various CB concentrations on two parameters; thermal stability and electrical conductivity. Homogeneity and morphology of the mixture were established using scanning electronic microscope images, and the wettability was ascertained using the Digi-drop instrument. Tests showed that electrical conductivity increased with increasing concentration of CB. However, thermal stability increases initially with concentration and then stabilizes at the higher range. The better filler-matrix interaction and filler dispersion, observed under the SEM, is the underlying reason behind improved properties. Various important relations were derived and studied, and the significant sensing property of PP/CB composite was established. We strongly believe that the product is an inexpensive and technically feasible sensor derived from recycled waste.

Awards Won:

Third Award of $1,000

NASA: Honorable Mention