# Synthesis of Thermally Stable Silicone Based Novel Electro - Conductive Grease using Sri Lankan Natural Vein Graphite

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Grease is a solid or semi-solid product which contains three main components such as base oil, thickener and an additive package. While reducing the contact resistance, repelling moisture and inhibiting the corrosion, the Electro-Conductive Grease (ECG) can prevent static buildup. Hence, they can be used as a gap filler in the moving parts of the electrical circuits. However, electric and electronic apparatus with moving parts generate heat and it is necessary to maintain ambient conditions for the normal operation. Therefore, to overcome such issues thermally stable ECG has been taken more attention recently. Most widely used silicone grease has dimethyl silicone oil as the base oil and can be performed -50 °C – 170 °C temperature range but unable to serve as conductors. Graphite is anisotropic, being a good electrical and thermal conductor within the layers. Further, the carbon layers can slide with respect to one another quite easily, thus making graphite a good lubricant. Therefore, mixing graphite and silicone grease would preferably combine the electro-conductive nature of graphite and thermal stability of silicone grease. Powdered natural vein graphite and the silicone grease were mixed at different weight ratios and stirred well. Three sample series were prepared based on different graphite powder sample sizes such as 75µm, 63µm and below 63µm. Each sample was tested with DC electrical conductivity and thermal stability. X-ray diffraction pattern of raw graphite was exhibited that availability of impurities such as pyrite which help to improve electrical conductance nature. Carbon content analysis showed that highest grade of graphite was used to develop the grease. The FTIR spectra were exhibited that characteristic stretching vibrations of functional groups attached to the samples. Out of the 3 sample series, the sample with 35% of 75µm size graphite powder with 65% of silicone grease shows the highest electrical conductivity of 2.86 x $10^{-7}$ $Scm^{-1}$ and able to show the wide service temperature range of 10°C to 120°C.

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