NANOSILVER PARTICLES FOR IMPROVED ELECTRICAL CONDUCTIVITY OF NATURAL RUBBER COMPOUND FOR NON-MARKING SOLID TIRES

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Electrically conductive black color rubber compounds are available for Solid tires. However there is a market gap for conductive, non-marking (non-black) solid tires. Therefore the main intention of this research was to make an electrically conductive non-black natural rubber compound for solid tires. It was successfully achieved by compounding the nanosilver particles into the natural rubber. Silver was selected as the electrical conductive filler, because it has the highest electrical conductivity (6.30×10^7 S/m) over the other metals and nanosilver particles can be easily synthesized. Effect of the curing agent for the electrical conductivity of nanosilver particle reinforced rubber compounds were studied by using sulphur and peroxide curing agents. Peroxide cured rubber compounds have shown the highest electrical conductivity, because they formed metal sulfides and reduced the electrical conductivity when sulphur was used as the curing agent. Then the effect of the filler networking for the electrical conductivity was studied by changing the parts (phr) of nanosilver particles from 0 to 16, and the optimum phr level was identified as the 4 phr which formed the continuous filler network. When the particle size of the metallic silver reduced from microns to nano range, particles were aggregated due to the high surface energy. When those agglomerates connected with each other, they formed continuous filler network. That phenomenon is known as 'Flocculation'. Because of the flocculation of metal particles, electrical conductivity was achieved by incorporating 4 phr of nanosilver particles into the rubber compound.

Keywords: *Electrical Conductivity, Nanosilver, Peroxide, Flocculation Theory, Non-marking Solid tires*

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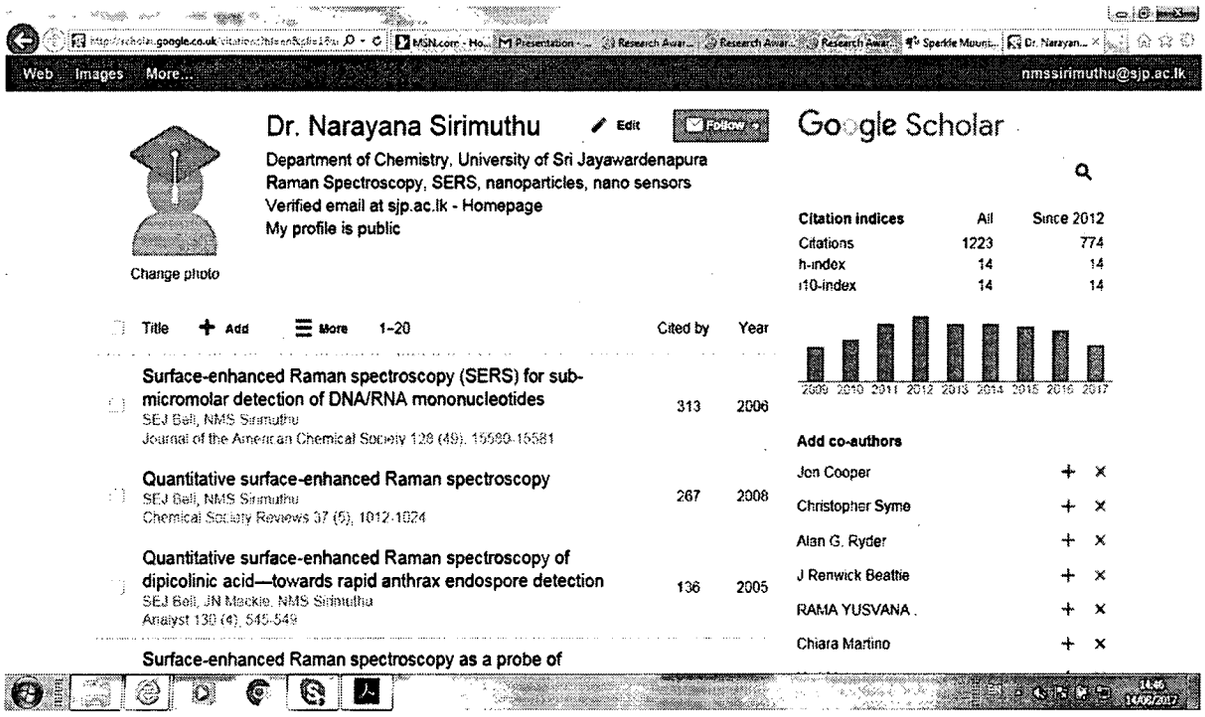

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