Reinforcement of Carboxylated Nitrile Rubber Latex Films by Surface Modified Nanosilica

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Natural rubber based vulcanizates possess fairly high tensile strength as they show strain induced crystallisation. However, over the years, there has been a growing concern on the potential allergy caused by natural rubber proteins. As a consequence, the demand for products based on synthetic elastomeric materials such as carboxylated acrylonitrile butadiene rubber latex (XNBR) has been increased. Most synthetic elastomers are non-self-reinforcing and consequently they inherent low strength when unfilled. Synthetic elastomer nano-composites reinforced a with low volume of nano-fillers exhibit high mechanical, thermal, barrier and flame-retardant properties. The performance of the particulate fillers on elastomeric applications intensely relies on filler-rubber interactions. Due to the filler-rubber interactions, polymer chains of the matrix adsorb onto the filler particle surface. Nano-fillers are quite difficult to disperse uniformly in rubber matrix due to their high surface energy resulting in huge agglomerations. The objective of this research was to address this issue by studying the effects of surface modified nanosilica on reinforcement of XNBR latex vulcanizates.

The effects of polymethacrylic acid & poly (methacrylic acid & ethylhexyl acrylate) polymers modified nanosilica as reinforcing filler on the properties of XNBR latex vulcanizates at different filler loadings were investigated. Evaluation of XNBR vulcanizate properties of micro silica, unmodified nanosilica and modified nanosilica filled vulcanizates revealed that the addition of small quantities of nanosilica brings about a significant increase in physical properties of XNBR vulcanizates, while higher filler loadings of nanosilica decrease such properties. 2% polymethacrylic acid modified nanosilica filled vulcanizates at 5 phr level of filler addition were found to possess most suitable properties demanded by dipped products such as gloves.

Keywords: *XNBR latex, Nano-Silica, Surface Modifier*