BROADBAND ELECTROMAGNETIC PROPERTIES OF CHLOROPRENE RUBBER AFTER LONG-TERM ULTRAVIOLET AGEING AND THERMAL DEGRADATION

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Chloroprene rubber (CR) is one of the most important synthetic rubber resins widely used in industry. Its excellent characteristics such as weather and ozone resistance, good resistance to open fire, adhesion to fabrics and metals, fuel resistance make it a requisite source material for the mass production of mechanical rubber goods. Useful properties of CR may be effectively extended by using them in composite materials, and many recent investigations have proven CR as an effective dielectric matrix in composites production [1-4].

The present work is focused on ultra-broadband experimental characterization of electromagnetic (EM) properties of neat chloroprene rubber materials as is and after various types of their degradation. Particularly, the complex dielectric permittivity of investigated materials was experimentally measured in low-frequency range 20 Hz-2 MHz using an impedance meter. The electromagnetic response was also measured in Ka-band (26-37 GHz) using scalar network analyzer and waveguide transmission line. Finally, the samples under study were investigated in 0.1-0.9 THz range using a THz time-domain spectrometer.

The well-defined correlation between degradation of CR and the change of its dielectric permittivity was observed. Within the frequency range of 1 kHz - 0.9 THz we found out that the thermal degradation together with the immersion of oil leads to a decrease of both real and imaginary parts of dielectric permittivity. Ultraviolet aging leading vice-versa to increase of dielectric permittivity of samples under study. Additionally, the influence of graphene inclusions on long-term ultraviolet aging and thermal degradation was investigated.

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