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Influence of Test Conditions on the Thermally Stimulated Current Characteristics of Silicone Rubber Used for Composite Insulators

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Composite insulators have been widely used in power system due to their perfect anti-flashover characteristics. The external insulation of the composite insulator will inevitably be aging during operation, which will affect the reliability and stability of the power network. Thermally Stimulated Current (TSC) technology has proven to be able to well evaluate aging state of composite insulator. In this paper, the TSC characteristics of silicone rubber materials under different polarization voltages, polarization temperatures, polarization times and heating rates were studied, and TSC test conditions suitable for silicone rubber material from composite insulators were explored. Meanwhile, research on TSC characteristics of silicone rubber with different thicknesses was carried out. The results indicate that the peak value of the thermally stimulated current is proportional to the applied polarization voltage. The peak current increases with the increase of the polarization time. In addition, there is a close relationship between the polarization temperature and the peak temperature (temperature corresponding to the emergence of the current peak). The current increases with the increase of heating rate, while its influence on the peak temperature is smaller. And the value of TSC increases when sample thickness increases. Based on the analysis of the results, the experimental parameters were ultimately determined as followed: the polarization temperature is 42.5°C, the polarization time is 20min, the polarization voltage is 10kV, the heating rate is 2°C/min and the sample thickness is 1.30mm. The results of this paper are expected to provide some references for the formulation of experimental parameters in the study of aging characteristics of composite insulators through TSC technology.

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