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ANTI-ICING AND DE-ICING GRAPHENE NAOPARTICLES REINFORCED EPOXY COATINGS

The use of renewable energy sources increases every year, replacing other more pollutants power sources. Wind turbines are frequently located in high altitude location and the snow and ice reduce their productivity due to the freezing of their components.
This research consists on inducing self-healing of nanoreinforced coatings based on Joule effect. A preliminary thermoelectrical evaluation at low temperatures is presented, using the electrical heating properties of graphene nanoparticles (GNPs) reinforced epoxy matrix to anti icing and de-icing applications. Different GNPs/epoxy nanocoatings with different nanofiller percentages and thickness of 200 um, were manufactured in a three-roll-mill machine controlling the gaps and the rollers speed. Anti-icing and de-icing tests were performed into a climatic chamber in the temperature range of -10 to -30 ºC in order to observe coating properties and functionality. The self-heating was promoted by Joule effect, applying low power in DC.

References

[1] S. K. Thomas, R. P. Cassoni, and C. D. Mac Arthur, “Aircraft Anti-Icing and De-Icing Techniques and Modeling,” vol. 33, no. 5, 1996.

[2] E. Enríquez, J. F. Fernández, J. De Frutos, and M. A. De la Rubia, “Tailoring of the electrical properties of carbon black–silica coatings for de-icing applications,” Ceram. Int., vol. 41, no. 2, Part B, pp. 2735–2743, 2015.

[3] R. Moriche, S. G. Prolongo, M. Sánchez, A. Jiménez-Suárez, M. J. Sayagués, and A. Ureña, “Morphological changes on graphene nanoplatelets induced during dispersion into an epoxy resin by different methods,” Compos. Part B Eng., vol. 72, pp. 199–205, 2015.

Figures

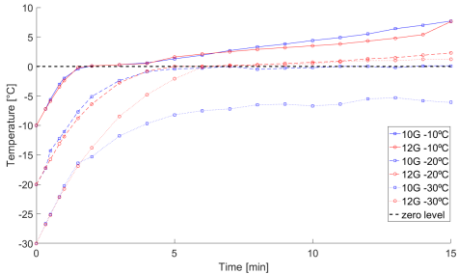

Figure 1: De-icing tests in climatic chamber at different ambient temperatures (-10ºC, -20ºC, -30 ºC) for 10 – 12% weight reinforced samples.

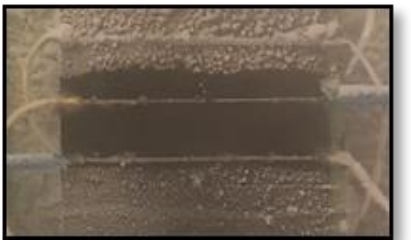

Figure 2: Anti-icing test result for 12% weight reinforced specimen.