

Electromechanical performances of dual system PDMS dielectric elastomer

Osman, Ahmad Farimin Ahmad^{a, b}; Jamil, Ahmad Hafiz Mohd^a; Zakaria, Shamsul^b

^a Multimedia University, Faculty of Engineering, Cyberjaya, Malaysia

^b Universiti Malaysia Pahang, Faculty of Industrial Science and Technology, Pahang, Malaysia

ABSTRACT

Polydimethylsiloxane (PDMS) based films, as one promising type of dielectric film, exhibit large deformation percentage and has good thermal tolerance. Despite significant mechanical performance, the drawback of PDMS dielectric elastomer (PDE) is that it has low relative permittivity. Several single systems like compositing hard filler or soft filler into the PDMS matrices is reported to enhance the relative permittivity to some extent however it also gives negative impact on other PDE parameters such as increasing Young's modulus and higher the risk of premature electrical breakdown. Thus, this paper presents the synthesis of dual system PDE that has two PDMS layers filled with high permittivity fillers. Then, the performance of the dual system is carefully investigated in terms of its breakdown strength, relative permittivity and Young's modulus. The results show that the dual system of TiO₂/ Gly demonstrates the most significant improvement in all three dielectric film parameters all in all.

KEYWORDS

Breakdown strength; Dielectric elastomer; PDE; Relative permittivity

ACKNOWLEDGMENT

This work was financially supported by PGRS Grant (PGRS 1903200) of Universiti Malaysia Pahang and FRDGS Grant (MMUE/210033) of Multimedia University, Malaysia.