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Electromechanical response of a silicone elastomer containing PPV SUMONMAN NAIMLANG, ANUVAT SIRIVAT, PPC, Chulalongkorn University — Electrorheological properties of PDMS gel and PPV/PDMS blend were investigated experimentally under an oscillatory shear mode at the temperature of 27°C to determine the effects of crosslink ratio, electric field strength and doping level. For the pure PDMS gels, the storage modulus, G' , increases with increasing crosslinking ratio and electric field at all frequencies between 0.1-100 rad/s. When an electric field is applied, the polymer molecules become polarized resulting in the interaction through the electrostatic force between the polarized PDMS molecules. The PDMS gel system with the crosslinking ratio of 0.01 possesses the highest G' sensitivity to electric field. For the PPV/PDMS blends (PPV/PDMS₁₀), the dynamic moduli, G' and G'' , are higher than those of pure PDMS in the absence of electric field because PPV particles act as a filler in PDMS matrix. The G' sensitivity of PDMS increases up to 35% at the electric field strength of 2 kV/mm. Moreover, the doped PPV/PDMS blend (doped PPV (1:10)/PDMS₁₀) shows the highest G' sensitivity (170%) due to interacting electrostatic forces between electric field induced dipole moments of the conductive molecules.

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