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Polyurethane Nanocomposites Reinforced with Core-shell Magnetic Particles for Microwave Absorption Applications ZHANHU GUO, Lamar University, JIAHUA ZHU, RAHUL PATIL, NEEL HALDOLAARACHCHIGE, DAVID YOUNG, SUYING WEI — Iron-silica core-shell particles with controlled shell thickness are fabricated using a sol-gel method. Polyurethane nanocomposites are fabricated with a surface initialized polymerization (SIP) method. The thermal stability of iron-silica NPs and its corresponding PNCs is significantly enhanced due to the barrier effect of silica shell. The anti-corrosive property of the core-shell particle is dramatically improved which is able to keep stable in 1M acid solutions. Salt fog exposure tests on PNCs reveal a better anti-corrosive performance with the incorporation of core-shell particles. By embedding different NPs, unique physical properties such as enlarged coercivity and dielectric constant (real permittivity) are observed. After coating a silica layer on iron NPs, the PNCs show lower real permittivity as compared to the PNCs filled with pure NPs. However, it is interesting to observe that only slight difference in real permeability is observed in both samples at the same loading. The permittivity and permeability of the PNCs are investigated with frequency ranging from 2-18 GHz. Results indicate that the PNCs reinforced with core-shell NPs exhibit a reflection loss in a wider frequency ranges. The maximum reflection loss is around -20 dB.

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