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## Influence of silica nanoparticles on the toughness of fusion bonded epoxy

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Fusion bonded epoxy (FBE) coatings are used worldwide where the long-term corrosion protection is critical as on oil, gas and water pipelines. These coatings are expected to last between 20 and 30 years without requiring a significant amount of monitoring or repair. To achieve this level of durability, the coatings must be perfectly applied with literally no bare metal exposed to the environment. However, due to performance requirements, it's necessary FBE coatings with high glass transition temperature ( $T_g$ ), that are inherently brittle. It may be possible to improve the performance of FBE coatings for pipeline corrosion protection by increasing the toughness of the coating. Inorganic particles have drawn much attention for toughening epoxy resins since such fillers can increase toughness without decreasing the  $T_g$ . A new approach to improve the toughness of epoxy resins is by incorporating nanofillers in the resin system. Due to their small size and large surface area nanoparticles are unique fillers yielding totally different effects and improved physical properties compared to conventional fillers with sizes in the micrometer range. This work evaluated the content of silica nanoparticles on the fracture toughness,  $T_g$ , coefficient of thermal expansion, viscosity, Young's modulus, yield stress and fracture energy of FBE coating. Thermomechanical analysis, single-edge notch bend test, picnometer equipment and screw-driven materials testing in tension were used to evaluation. Scanning Electron Microscopy and transmission Electron Microscopy investigated the nanocomposite morphology. All the parameters were improved with exception of viscosity that is an important factor to be controlled in FBE coatings.

### Biography

Patrícia Alves Saliba is graduated in 2011 and received M.Sc in 2012 from the Department of Chemical Engineering - Federal University of Minas Gerais. Since 2013 she is coursing Ph.D in Program Metallurgical, Materials and Mining Engineering - Federal University of Minas Gerais. Patricia's research interests are Fusion bond epoxy coatings.

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