ABSTRACT:

To facilitate the interpretation of experimental data, a micromechanical modeling procedure is developed to predict the viscoelastic properties of a graphite nanoplatelet/epoxy composite as a function of volume fraction and nanoplatelet diameter. The storage and loss moduli predicted for the composite are compared to values measured from the same material using three test methods: dynamical mechanical analysis, nanoindentation, and quasi-static tensile tests. In most cases, the model and experiments indicate that for increasing volume fractions of nanoplatelets, both the storage and the loss moduli increase. In addition, the results indicate that for nanoplatelet sizes above 15 mm, nanoindentation is capable of measuring properties of individual constituents of a composite system. A comparison of the values predicted to the data measured helps to illustrate the relative similarities and differences between the bulk and the local measurement techniques.