In situ microstructural measurements: coupling mechanical, dielectrical, thermal analysis with Raman spectroscopy for nanocomposites characterization

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☒ Oral presentation ☐ Poster presentation

ABSTRACT

From a technological point of view, vibrational spectroscopy techniques have evolved considerably in recent years. They are faster, have better spectral and spatial resolutions and are more sensitive. Moreover, when combined with statistical analysis methods, they allow at line/on line or real-time measurements with times compatible with industrial processes. These technological evolutions (more powerful sources, more sensitive detectors, use of optical fibers, etc.) also lead to the miniaturization of instruments which can now be used in industrial or hostile environments. However, this requires an upstream study or learning of Raman spectroscopy to respond and model this measurement to identify the pertinent spectroscopic parameter(s) related to the physico-chemical properties in order to build a model.

In this talk, several examples describing results of coupling experimental techniques and *in situ* measurements from various research works will be presented [1].

It will be shown through these selected examples that filler addition and its particle size have an influence on the Raman spectroscopy measurement, in particular that the response can be related to the size or volume of defects in the material. It will be also shown that complementary information can be drawn from *in situ* coupling of experiments with Raman spectroscopy to analyze the various thermal, mechanical or dielectric results obtained.

Keywords: Nanocomposite, Polymer, *in situ* coupling measurements, Raman spectroscopy, Mechanical properties, Dielectrical properties

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