



Polymer Nanocomposites

Technical Work Area 33

Project 2

Chemical composition of nanofillers

Objectives

The main objective of this project is to develop validated procedures for the chemical composition measurement of nanomaterials used as fillers in polymer matrix.

Background

Nanoparticles are widely used as fillers in the production of polymer nanocomposites (PNC) which is a new class of commercial materials. These materials represent a new alternative to conventionally filled polymers. Because of their nanometer size filler dispersion, nanocomposites exhibit markedly improved properties when compared to the pure polymers or their traditional composites. These include increased modulus and strength, outstanding barrier properties, improved solvent and heat resistance and decreased flammability.

The chemical composition of nanomaterials used as a source of nano-objects is one of the critical characteristics because it can influence the final PNC properties, including their toxicity. Consequently, the reliable characterization of chemical composition is a necessary task for specification of nanofillers especially for regulatory purposes.

The initial measurements will consider the chemical composition of nanoclays as it is one of the most commonly used commercial filler for the preparation of PNCs.

Standardization Needs

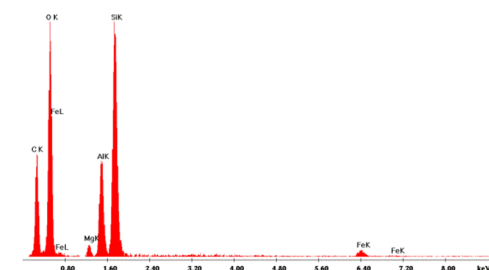
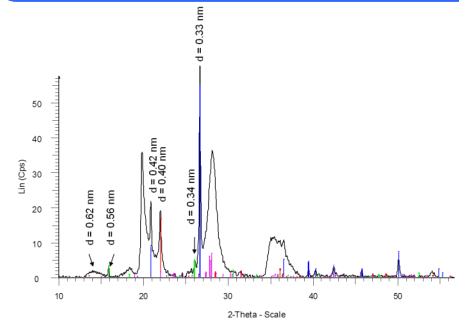
There are no internationally harmonized standards at present for the chemical composition measurement of nanomaterials used as fillers in polymer matrix. There are important needs for protocols on reliable, accurate and reproducible measurement for different types of nanofillers that are widely used in a number of commercial PNCs. Once the methods are validated, proposals can be made to be considered for future standardisation.

Work Programme

Measurements and related methods for determination of chemical composition will be developed to include:

- Preparation of a batch of bottled units of clay for intercomparison studies.
- Organization of round robin on determination of chemical composition of clay samples by:

Call for Participation



- ◆ X-ray fluorescence analysis by fusion bead or pressed pellet method
- ◆ Energy dispersive X-ray analysis (EDX)
- ◆ Inductively coupled plasma /optical emission spectrometry (ICP/OES)

Deliverables and Dissemination

- Measurement procedures to determine the chemical composition of nanoclays used as fillers in polymer matrix,
- VAMAS Technical Report,
- Publications in scientific journals,
- Submission of drafts to be considered for future international standardisation (e.g. via ISO/TC 229).

Funding

Participation is based on in-kind contributions from the partners.

Status

Implementation of X-ray fluorescence analysis by fusion bead method in progress. Call for additional participants

For more information on participation, please contact:

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