

Better understanding of nano-scale distribution of nanofibers facilitated new product development



COMPANY FACTS

ANF Development OÜ, Registered in 2012

Number of employees (2016) 19

Business area production of nano alumina masterbatch dispersions

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Why the company engaged in the experiment?

The company was in search of the possibility to carry out specific measurements and analysis that were extremely needed for the further development of the company's new potential products.

Has the experiment provided the information that had an impact on development processes?

All the experimental work and the quality of the results have fully met our expectations and helped in understanding the next steps for the product R&D.

Has the company been in dialogue with Industrial Research Centers (IRECs)?

The theoretical background concerning the measurements was provided by the IREC. Furthermore, several meetings with IREC researchers helped us to understand the topic deeper.

WHAT did we do?

Research The main purpose of the research is the investigation of structural properties of novel nanocomposites, which included the distribution of alumina nanofibres in resin systems. The secondary focus is to study the actual functionalization of nanofibre surfaces, which were subjected to chemical treatment.

Method The slices of the samples are cut by the SEM-FIB method, and measured by Titan G2 80-200 Transmission Electron Microscope with increasing resolution in the areas, where the fibres are expected to be found and where the structural defects of the cured resin are expected to be seen.

Materials used Alumina nanofibres in multiple different composite resin systems.

HOW did it benefit

... the company

The company was able to continue product development of multiple new products by getting factual information about the nano-scale distribution of nanofibres and the structure of the resin in the 5 sample materials. As the company found a local partner to continue their product development and to better understand the effect of surface functionalization and different components in the resin system.

... the material science area

The composition of alumina nanofibres in resin system samples were studied by means of Transmission Electron Microscopy. The main result was that the nanofibres tend to be too agglomerated and not distributed homogeneously enough in these new systems.

The other result was that specialty resins did not peel into layers as was feared and behaved well, even though they had micrometer-size droplets of oily material distributed inside.

The main implication was that the company might need an even more uniform distribution of nanofibres into the resin system: either increase the hydrophobic functionalization or mixing activity of the highly viscous systems before curing, etc.

... the regional policy framework on innovation

Modernisation of high-tech measurement equipment – i.e. the experiment side is among the regional development priorities. The development of closer ties between the research and industrial sectors is related to the growth area of research and innovation strategy for smart specialisation (RIS3) with a focus on more efficient use of resources.



Titan G2 80-200 Transmission Electron Microscope used for the experiment

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