4th International Symposium on
Energy Challenges & Mechanics
- working on small scales

11-13 August 2015
Aberdeen, Scotland, UK

# Mechanical properties of composite materials by PeakForce Quantitative Nanomechanical Mapping technique

Agnieszka Tercjak*, Laida Cano, Sheyla Carrasco-Hernandez, Raquel Fernandez, Junkal Gutierrez

*Group `Materials+Technologies´, Department of Chemical and Environmental Engineering*
*University of the Basque Country, Plaza Europa 1, 20018 Donostia-San Sebastián, Spain*

Accepted for publication on the 25th of January 2015

Nowadays, the main interest of many research groups is focused on development and characterization of novel composite materials. Intensive progresses in Materials Science and Nanotechnology required advanced techniques, which allow to investigate the properties of fabricated composite materials at the nanoscale to better understand their behavior at the macroscale. The last is related directly to the wide range of application of these novel composites materials in constructions, aeronautic, electronic, medicine, pharmaceutics, cosmetics and others.

Atomic force microscopy (AFM) is one of the most widely used techniques to study topography and morphology of different composite materials at the nanoscale level. As it is well known this techniques allow to measure magnetic (magnetic force microscopy (MFM)) and electric (electrostatic force microscopy (EFM), tunneling atomic force microscopy (TUNA)) properties. The progressive development of this technique, in the last decade, moves AFM measurements beyond just imaging contrast to quantitative nanomechanical properties. This novel technology called PeakForce Quantitative Nanomechanical Mapping (PeakForce QNM) allows to simultaneously mapping the topography, elastic modulus and adhesion of composite materials.

In present work, different kind of composites materials was successfully analyzed using PeakForce QNM techniques to better understand the relationship between mechanical properties and morphology of design composite materials at the nanoscale level. The measurement was performed using a Dimension Icon microscope equipped with a Nanoscope V controller from Bruker.

**Keywords**: composites, atomic force microscopy, nanomechanical properties