

University of Salerno

Department of Chemistry and Biology



Ph.D. Thesis in Chemistry

# **New Technologies in Tires: From Layered Nanofillers to Metathesis Reactions**

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## **Abstract**

Tires are annually manufactured in more than one billion of artefacts and the ever increasing demand is on the basis of the efforts in finding new solutions for more performant, sustainable and durable products. This PhD thesis presents highly new contributions to the nanotechnology applied to rubber nanocomposites, particularly focussing on clays and graphitic fillers with tunable periodicities and degree of order of their structures. The interaction of layered nanofillers with the rubber matrix was investigated, correlating nanocomposites structure and morphology, studied by means of X-ray diffraction and transmission electron microscopy, with measured tensile and dynamic-mechanical properties. Unique reversible thermal transitions of nanocomposites containing organoclays and graphite oxide intercalation compounds were also investigated through differential scanning calorimetry. Metathesis applied to the rubber chemistry is presented as a strongly innovative technology to produce novel rubber materials, hardly obtainable with conventional synthetic methods and to promote the degradation of rubbers, when the latter process is desired.