CUSTOMISED NANOCOMPOSITES BASED ON RUBBER MATRICES FOR HIGH DEMAND APPLICATIONS.

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I. INTRODUCTION.
The NANORUB project aims to improve the knowledge and understanding of nanofillers and their application to rubber products facilitating the development of high performance formulations. The project’s aim is to demonstrate the opportunity of providing step changes in the performance of elastomeric materials through the incorporation of mineral nanofillers. Target property improvements include notable increase in modulus and tensile strength, gas/liquid transmission rates reduced, and tear strength improved by 20%. One of the other main goals of this project is to avoid the effect on the vulcanisation processes of commercial nanofillers.

II. EXPERIMENTAL.
1. Organic modification of Montmorillonite
2. Production of specific composites
3. Production/testing of nanorubber prototypes

III. ORGANIC MODIFIERS (Exfoliants).
- Polymeric ammonium salts
- Low MW polymerizable ammonium salts

IV. COUPLING AGENTS.
- Purpose-designed silanes
- Functionalized rubber
- Reactive Oligomer

V. RESULTS.
IR spectra of modified nanoclays
XRD Analysis

VI. CONCLUSIONS.
- A new procedure for the organic modification (exfoliation) and impregnation with coupling agents of new nanofillers (montmorillonite) has been developed. New organic treatment achieves the complete exfoliation of the montmorillonite.
- New organic nanoclay developed has been successfully tested into rubber compound increasing mechanical properties and keeping processing conditions, rheological properties and vulcanisation rates.

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