



UNIVERSITÀ DEGLI STUDI DI NAPOLI "FEDERICO II"

Dipartimento di Scienze Chimiche

Dottorato in Scienze Chimiche - XXXVI

***Ph.D. in Chemical Sciences
Cycle XXXVI***

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Research project title:

Structural and Dynamic complexity of isobutylene-based homo- co-polymers

Keywords: Stress-induced crystallization; Thermoplastic and cross-linked elastomers; Structure-properties relationships; Conformational analysis; Crystal structure.

Research project abstract:

Aim of the project is to investigate the vinylidene effect, that is the unusual properties of polyisobutylene (PIB) and of butyl rubbers (BR), the copolymers of isobutylene with isoprene. PIB is an amorphous polymer showing high steric hindrance and strain-induced crystallization. Compared to atactic polypropylene (aPP), which represents the monosubstituted counterpart, PIB shows much lower glass transition temperature, properties of weakly fragile glass former and low permeability to gases. These 'anomalous' properties make PIB materials of industrial interest for tire industry and biomedical applications. So far, the role of chain conformation and chain dynamics in the crystalline and amorphous state on the vinylidene effect has been overlooked. The aim of the project is to unravel this issue and include rheology measurements, SANS/SAXS and WAXS analysis and solid state NMR to probe the chain dynamics and relaxation phenomena of these intriguing systems.