

# Characterization of Natural Rubber mesostructure

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## Abstract

To study NR mesostructure (macromolecular structure + aggregates or gels) (Figure 1), the NR sample is placed in a good solvent of polyisoprene (cyclohexane, toluene or tetrahydrofuran). In addition to a soluble fraction, there is always an insoluble fraction called *macrogel* (Figure 1) or *gel* depending on the authors [1-4]. The gel fraction of NR not only consists of an insoluble fraction or macrogel, but also includes a fair quantity of *microaggregates* or *microgels* (sphere-like or core-shell structure) distributed in the soluble fraction with the polyisoprene macromolecules (random coil structure) (Figure 1) [5]. The gel in NR formed because of associations between poly(cis-1,4-isoprene) chains due to interactions with non-isoprene compounds (proteins [6-7] and lipids [8]).

The characterization of NR mesostructure by separative methods coupled to a multiangular light scattering (MALS) detector is presented. The separative methods used were size exclusion chromatography (SEC) [5,9] and asymmetrical field-flow fractionation (AsFIFFF) [10]. These two techniques offer the opportunity to fully characterize NR mesostructure (average molar masses, size, microaggregates, conformation, and gel contents). Two examples of AsFIFFF-MALS use are presented: (i) characterization of NR mesostructure from different *Hevea brasiliensis* genotypes, (ii) characterization of the dynamic structuring of NR.

A focus is on microaggregates with sizes smaller than 1  $\mu\text{m}$  ( $\text{Gel}_{<1\mu}$ ). They were purified by SEC and analyzed by TEM [11]. The different changes in the microaggregate structure after mastication (thermal or mechanical) were also studied [12]. Lastly, the relation with the protein content and crosslink density of the macrogel [13] is presented.

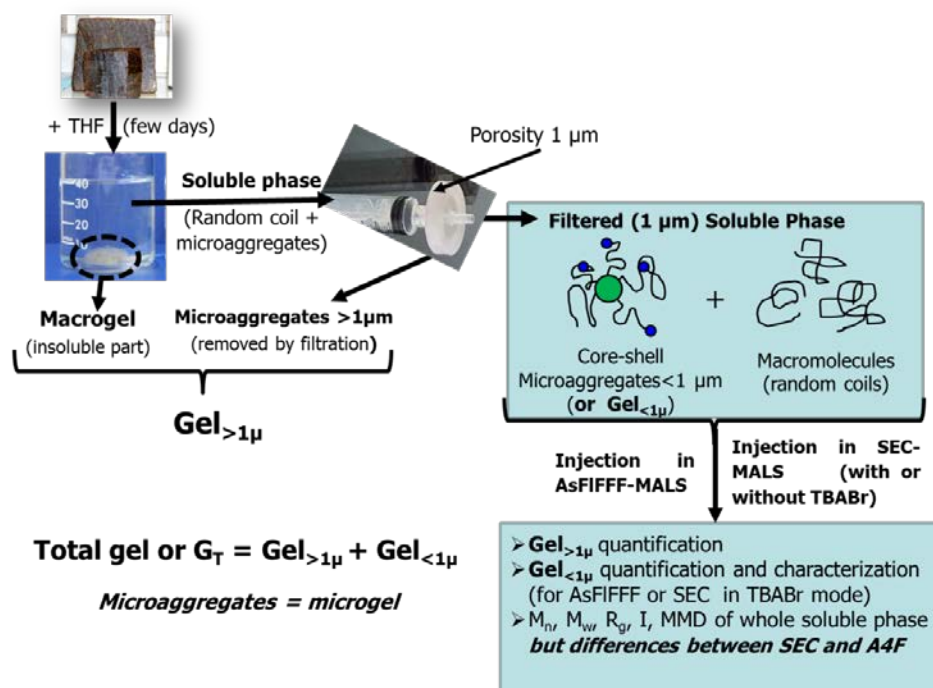


Figure 1: Different types of aggregates (or gels) present in a solution of natural rubber in tetrahydrofuran (THF).

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