



ΠΡΟΣ

- 1) Όλα τα μέλη ΔΕΠ του Τμήματος Επιστήμης και Τεχνολογίας Υλικών
- 2) Τους εκπροσώπους των Μεταπτυχιακών φοιτητών του Τ.Ε.ΤΥ
- 3) Την Επταμελή Εξεταστική Επιτροπή
- 4) Όλα τα μέλη της Πανεπιστημιακής Κοινότητας

**Πρόσκληση σε Δημόσια Παρουσίαση της Διδακτορικής
Διατριβής της**

κ. Θεοδωράτου Αντιγόνης

(Σύμφωνα με το άρθρο 12 του Ν. 2083/92)

Την Παρασκευή 11 Σεπτεμβρίου 2015 και ώρα 11:00

στην αίθουσα Α115 στο κτίριο του Τμήματος Επιστήμης
Υπολογιστών

θα γίνει η δημόσια παρουσίαση και υποστήριξη της Διδακτορικής
Διατριβής της υποψήφιας διδάκτορα του Τμήματος Επιστήμης και
Τεχνολογίας Υλικών

κ. Θεοδωράτου Αντιγόνης με θέμα:

**«Δομή και Ρεολογία Μακρομοριακών Συστημάτων σε
Διεπιφάνειες»**

ABSTRACT

This thesis focuses on the structural and rheological properties of viscoelastic films at the air-water interface. Our aim is to tailor the rheological properties of fluid interfaces and link them with their structure at the molecular scale. Langmuir quasi-monolayers were built by employing three different types of macromolecular systems, a series of semifluorinated alkanes that consist of two hydrophobic segments, a homopolymer with one hydrophobic tail and one hydrophilic head, Poly(methyl methacrylate) (PMMA), and block copolymers of PEO-PDMS with different molecular architectures. The techniques employed in this thesis include Langmuir-Pockels trough, to measure surface pressure/ area isotherms, and the magnetic rod interfacial stress rheometer, double wall ring fixture and bi-conical device in commercial rheometers for interfacial rheology studies. For structural studies of the films at the air-water interface we performed neutron reflectivity measurements and scanning force microscopy.



We observed great tunability of the structural and rheological properties of the semifluorinated alkanes moving from simple linear molecules to more complex and branched architectures, showing that molecular modification can change dramatically the viscoelastic response of the layers. Regardless of the molecular architecture effect, the external light stimulus effect was investigated for photo-sensitive semifluorinated

alkanes that could change their conformation reversibly from trans to cis. One of the main findings of this study was the transition from ordered to mixed (disordered) structures whose onset is signaled by the drop of the interfacial storage modulus of about one order of magnitude.

The predominantly elastic layers of PMMA were used to investigate the presence of even harmonics among different rheometry techniques. By analysing the strain signal in the Fourier space, it was found that the bi-conical and the double wall ring fixture do not generate even harmonics while the magnetic rod showed the presence of second harmonics that are connected with asymmetry in the stress-strain profile, apparently stemming from ununiformity in flow and the subphase contribution.

Finally, the diblock and triblock copolymers of PEO-PDMS exhibit perfectly reversible layers at the air-water interface showing a reproducible PDMS phase transition for all the different molecular weights. Moreover, the average Flory radius of the polymers scale as $RF-N^{\nu}$ with $\nu=0.56$. Such result are in agreement with predicted scaling for 2D-polymers in bad solvent conditions.