ΠΑΝΕΠΙΣΤΗΜΙΟ ΚΡΗΤΗΣ

ΤΜΗΜΑ ΕΠΙΣΤΗΜΗΣ & ΤΕΧΝΟΛΟΓΙΑΣ ΥΛΙΚΩΝ

UNIVERSITY OF CRETE

DEPARTMENT OF MATERIALS SCIENCE & TECHNOLOGY

ΠΡΟΣ

1) Όλα τα μέλη ΔΕΠ του Τμήματος Επιστήμης και Τεχνολογίας Υλικών

2) Την Επταμελή Εξεταστική Επιτροπή

3) Όλα τα μέλη της Πανεπιστημιακής Κοινότητας

Πρόσκληση σε Δημόσια Παρουσίαση της Διδακτορικής Διατριβής του

κ. Leo Gury

(Σύμφωνα με το άρθρο 41 του Ν. 4485/2017)

Την **Δευτέρα 2 Σεπτεμβρίου 2019** και ώρα **15:00** στην **αίθουσα Τηλε-εκπαίδευσης,** στο κτήριο του **Τμήματος Μαθηματικών και Εφαρμοσμένων Μαθηματικών** του Πανεπιστημίου Κρήτης, θα γίνει η δημόσια παρουσίαση και υποστήριξη της Διδακτορικής Διατριβής του υποψήφιου διδάκτορα του Τμήματος Επιστήμης και Τεχνολογίας Υλικών κ. Leo Gury με θέμα:

«An Investigation of Dynamic Transitions in Crowded Model Soft Colloids»

Abstract:

At high packing fractions, colloidal suspensions are yield stress materials that are characterized by a solid behavior at rest and an ability to flow under a sufficient applied stress. While the formation of an organized crystalline phase may occur under certain conditions of concentration, preparation and monodipersity, most systems usually form disorganized glasses. The solid regime of hard colloids is theoretically limited by their close packing fraction (74% in the case of spheres), but the experimentally accessible limit is often the random close packing (64% for spheres) and therefore the solid regime only exists in a small range of packing fractions. The ability of soft colloids to deform and accommodate contacts (deswelling, faceting, interpenetration) extends the range of concentrations over which they form a solid phase, but also complicates the evolution of the dynamic properties in this regime. As such, the systematic study of these properties requires the use of well-characterized model systems. In this work, we report on a thorough examination of the rheological properties of the two main experimental model soft colloids, namely star polymers and microgel particles. In particular, we focus here on a very dense star polymer with nearly 900 short arms (5.8 $kg.mol^{-1}$ per arm). We perform a series of rheological tests both in the linear and nonlinear regime. The differences between the two systems may be attributed to the main microstructural difference, the presence of dangling chains in star polymers, which are absent

in microgels. We also find striking similarities, not only between the two investigated systems, but also in the data of the available literature on soft colloids, which suggests a possible universal behavior. In particular, we find that a change in the evolution of dynamic properties inside the solid regime seems ubiquitous, and we call it jamming. Several arguments point towards a transition to a regime where elasticity becomes dominated by contacts when the packing fraction reaches values very close to 1. If proven correct, this may provide a useful link between the microstructural properties (chemical composition, softness) of soft colloids and their macroscopic rheological properties (elasticity, yielding, and behavior under flow). The objective of this work is therefore to provide and disseminate reliable data to help create a strong basis for the design of novel soft materials with tunable performances.