Effect of crosslinker density on the dynamic and energetic properties of concentrated PNIPAM microgel solutions

María Tirado-Miranda [a], María Pedrosa-Bustos [a], Marco Laurati [b], Miguel Ángel Fernández-Rodríguez [a] and Ana Belén Jódar-Reyes [a]

[a] Biocolloid and Fluid Physics Group, Applied Physics Department, University of Granada, Granada, Spain,
[b] Dipartimento di Chimica 'Ugo Schiff', University of Florence, Florence, Italy.

ajodar@ugr.es

PNIPAM microgels are used as model systems for studying the properties of thermosensitive microgels. Their responsive behavior makes them ideal systems for the fabrication of smart materials with multiple commercial applications, which require an understanding of their dynamics and interactions. In this work, we have studied the effect of the crosslinker (BIS) density used in the synthesis of PNIPAM microgels on both their dynamics and interactions at room temperature (swollen state) as we increase the volume fraction of particles in the medium. Using Confocal Laser Scanning Microscopy, we have characterized: i) the dynamics of the system, determining the Mean Squared Displacement (*MSD*) as a function of time; ii) the interaction between particles, through the pair correlation function (*g(r))* . The results have showed that: i) depending on the crosslinking density, we could change the phase of the system; and ii) it is very important to establish a valid criterion for calculating the particle volume fraction (using complementary techniques such as static and dynamic light scattering) to make comparisons between microgels with different degrees of crosslinking.

Keywords:
PNIPAM microgels, thermosensitive microgels, crosslinking density, Mean Squared Displacement, pair correlation function, phase behavior

Acknowledgements:
The authors acknowledge the support of grant PID2022-136540NB-I00 funded by MICIU/AEI/10.13039/501100011033 and FEDER, UE