

## Polystyrene inhibits saturated lipids' main phase transition

Mattia I. Morandi, André P. Schroder, Carlos M. Marques

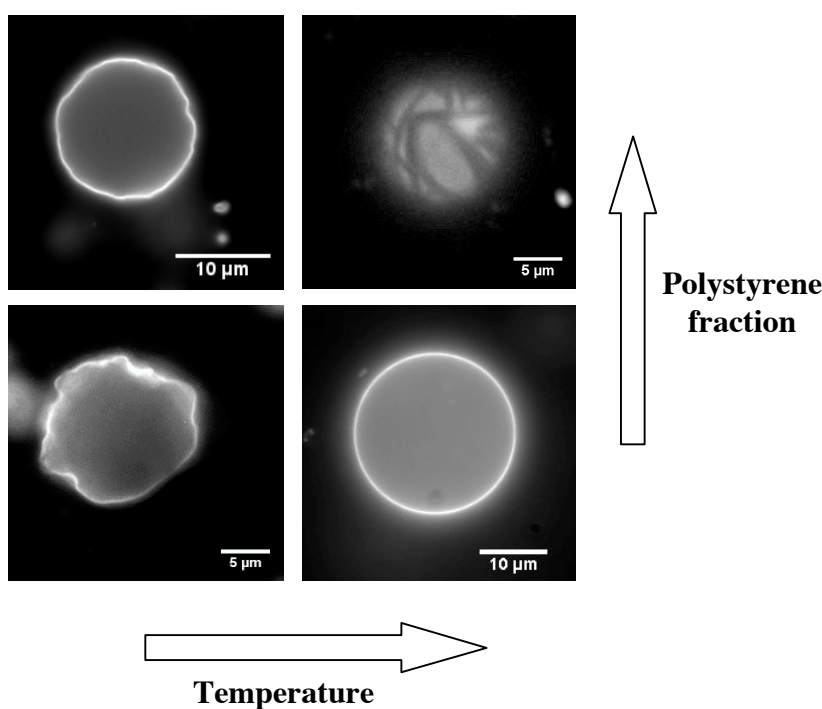
*Institut Charles Sadron CNRS, 23 Rue de Loess, 67034, Strasbourg, France  
mmorandi@unistra.fr*

### Abstract

Studies on the accumulation of polystyrene and similar polymeric nanoparticles in eukaryotic cells have recently been launched, amidst concerns raised by the growing plastic waste in the oceans and elsewhere and by the development of nanotechnologies. The effect of this and other polymers on cell metabolism is however far from being understood, and the fundamental mechanisms of their interaction with the different cell components are yet to be addressed.

Simulations performed on lipid bilayers showed changes in membrane mechanical properties induced by polystyrene<sup>1</sup>, as well as significant effects on lipid phase behaviour, therefore suggesting potential hazardous implications for the plasma and the organelle membranes. However, experimental results performed on cells membranes or on cell membrane models are still missing<sup>2</sup>.

In our experiments, by using a combination of differential scanning calorimetry (DSC) and generalized polarization<sup>3</sup> (GP) in liposomes and laser scanning confocal microscopy in Giant Unilamellar Vesicles (GUVs), we quantified alterations of phase transition in saturated lipid membranes with increasing molar fractions of polystyrene. Our results show that polystyrene disrupts the phase behaviour of lipid membranes, modifying the thermodynamics of the transition through a spatial modulation of lipid composition.



<sup>1</sup> Rossi, G., Barnoud, J., & Monticelli, L. (2014). *J.Phys.Chem.Lett*, 241-246.

<sup>2</sup> Jung, M., Robinson, B. H. Steytler, D.C., German, A. L., and Heenan, R. K. (2002). *Langmuir*

<sup>3</sup> Sanchez, S. A., Tricerri, M.A., G. Gunther and E.Gratton,