Séminaire du laboratoire PIMM

Jeudi 13 octobre 2022 à 13h30

Dr. Jean COMTET

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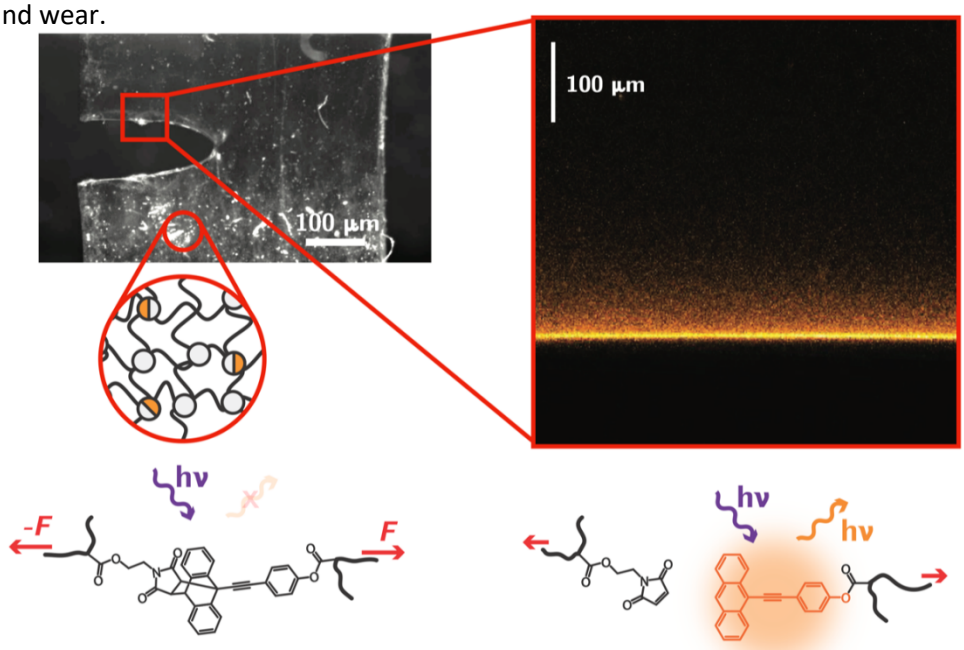
présentera dans le cadre du séminaire ces travaux intitulés :

Molecular mechanics of soft elastomers: how to measure damage by chain scission and what can we get from it?

Soft elastomer-based materials composed of dense networks of cross-linked polymer chains are highly valued for a number of applications, ranging from classical tire materials in the automotive industry, to the emerging fields of flexible prosthetics, stretchable electrodes, or soft robotics. Understanding and predicting the resistance and lifetime before failure of these materials accordingly represents an important and fundamental issue.

I will discuss in this seminar two key mechanical properties of soft elastomers, related to their resistance to fracture propagation and resistance to frictional wear. At the microscopic scale, both processes involve ultimately the scission of polymer strands in the material. However, the role played by these molecular-scale damage processes has remained poorly understood, due to the lack of adequate tools to quantify them. I will show how novel mechanochemical approaches relying on the use of damage-sensitive molecular probes can be used to detect and quantify damage by polymer strand scission in simple and reinforced elastomers. I will then show how this quantitative access to molecular damage can provide new insights into these long-standing mechanics questions related to fracture and wear.



J Slootman, CJ Yeh, P Millereau, J Comtet, C Creton, A *molecular interpretation of the toughness of multiple network elastomers at high temperature.*. *PNAS* (2022)

J Slootman, V Waltz, CJ Yeh, C Baumann, R Göstl, J Comtet, C Creton, *Quantifying rate and temperature dependent molecular damage in elastomer fracture. Physical Review X* (2020).