Do you remember when you were small and you observed water drops dripping from a faucet or raindrops movements on a pane? The behaviors of droplets are ubiquitous phenomena in nature and daily life, but still fascinating for scientists as they are crucial for a broad spectrum of technologies. This includes fuel spray, multiphase reaction, spray cooling of high-power electronic devices, drug delivery, and many others, thereby playing a profound role in our societies and industries. A way of improving these technologies by gaining greater control over the relevant droplet dynamic processes can be achieved by adding dyadic molecules that consist of a hydrophilic (*i.e.* attracting water) head and a hydrophobic (*i.e.* repelling water) tail, known as surfactants. Thanks to their particular head–tail structure, surfactants can preferentially adsorb at interfaces (*e.g.* liquid-vapor surface) where many key processes are taking place when droplets change topologically, for example, during the coalescence or the break-up of droplets. In fact, these phenomena are particularly complex as they unfold in length and time scales that range from the microscopic transport of surfactants to the macroscopic changes in the morphology of the droplets. Hence, to understand these phenomena and propose an optimum design for the droplets and the surfactant molecules, a combined approach of different methodologies is necessary. In this project, we will use state-of-the-art experimental and simulation methods to investigate and describe the droplet coalescence and break-up processes in the presence of surfactants. Many fundamental issues relevant for a range of technological applications will be addressed, such as the interplay between subtle transport of solvent and surfactant molecules and changing morphology of the droplets upon their coalescence and break-up processes.