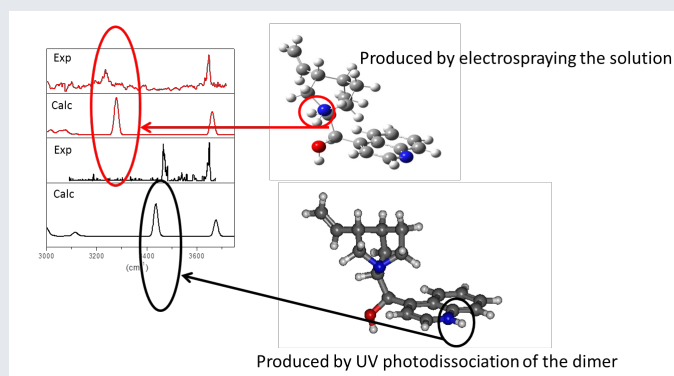


## Understanding the photo-stability of isolated biomolecules

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Nature has developed complex mechanisms for protecting biomolecules from light and radiation-induced damages. Studying the photo-reactions mechanisms in biomolecules is therefore of prime interest for understanding their photo-stability.

To this end, two teams from the Laboratoire de Chimie Physique (Débora Scuderi) and Institut des Sciences Moléculaires d'Orsay (Anne Zehnacker) have proposed an experiment localized at the mass spectrometry platform of the CLIO free-electron laser (FEL) facility (Laboratoire de Chimie Physique). This set-up aims at characterizing the structure of photo-fragments resulting from the UV-induced dissociation of biomolecules. It involves tandem mass spectrometry experiments in a quadrupole ion trap. A UV laser induces photo-dissociation and an IR laser (CLIO FEL or optical parametric oscillator) probes their structure by vibrational spectroscopy. This set-up has been applied to the study of quinine-based alkaloids. These molecules exhibit complex photo-induced processes involving coupled electron and proton transfer reactions. The photo-fragmentation mechanisms are sensitive to the local environment; those observed for the protonated dimer differ from those in the monomer. We have shown in particular the formation of a metastable exotic alkaloid monomer, protonated on the aromatic ring, which results from photo-induced proton transfer followed by the dissociation of the dimer. Last, complexation by sulfuric acid has a protective effect on the molecules and results to a photo-stable complex.



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