Liquid-induced fluorescence emission changes in beetle scales

Mouchet S. R.¹,²,* Lobet M.¹, Kolaric B.¹, Kaczmarek A. M.³, Van Deun R.³, Vukusic P.², Deparis O.¹, Van Hooijdonk E.¹

¹ Department of Physics, University of Namur (UNamur), Rue de Bruxelles 61, B-5000 Namur, Belgium
² College of Engineering, Mathematics and Physical Sciences, University of Exeter, Physics building, Stocker Road, Exeter EX4 4QL, United Kingdom
³ L³ – Luminescent Lanthanide Lab, Department of Inorganic & Physical Chemistry, Ghent University, Krijgslaan 281-S3, B-9000 Ghent, Belgium
* s.mouchet@exeter.ac.uk

Many animals (arthropods, birds or fishes) are known to give rise to fluorescence emission when they are illuminated by ultraviolet light¹-³. The emission of light originates from the presence of fluorophores in the living organism teguments. The confinement of fluorescent probes within photonic structures enables the so-called controlled fluorescence, which is known to lead to modifications of the fluorescence properties such as intensity (enhancement/inhibition) or spatial distribution (directivity of emission). Such a photonic confinement is found in several living organisms¹-³.

Liquid-induced fluorescence changes in insects, on the other hand, still remain under-explored. We investigate here the case of fluorescent beetles of which the macroporous photonic structures covering the elytra contain embedded fluorophores⁴. These structures control both the insect colouration and fluorescence. Contact with liquids turns out to induce variations of the spectral and spatial distributions of the fluorescence.