# A new biological application of nanoscintillators: triggering biorthogonal photoclick reactions.

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Nanoscintillators emerged in the early 2000s and have rapidly evolved from materials of purely fundamental interest into versatile tools for a wide range of applications. Beyond radiation detection, their nanoscale dimensions make them particularly well suited for biological uses, notably in cancer theranostics. We have recently reviewed the field and identified five major theranostic applications of nanoscintillators [1]. In this presentation, we propose an additional and high potential biological application: the *in vivo* triggering of a bioorthogonal photoclick reaction.

Click chemistry refers to a class of simple, fast, and highly selective reactions that efficiently join molecular building blocks under mild conditions [2]. **Bioorthogonal photoclick** chemistry is a light-activated click reaction that can proceed inside living systems without interfering with native biochemical processes, enabling precise spatial and temporal control of biomolecule labeling [3]. Triggering such reactions *in vivo* therefore holds tremendous potential.

In this presentation, we will describe the strategy we are developing to **trigger a bioorthogonal photoclick reaction using nanoscintillators** (Figure 1). Cerium-doped $YPO_4$ nanoscintillators were synthesized *via* a microwave-assisted hydrothermal synthesis and subsequently grafted with the phenanthrequinone (PQ) photoclickable moiety. We demonstrate that the photoclick reaction yielding the blue-emitting phenanthrodioxine (PDO) can be successfully triggered at the surface of the nanoscintillators, highlighting their potential as remote activators of bioorthogonal chemistry *in vivo*.

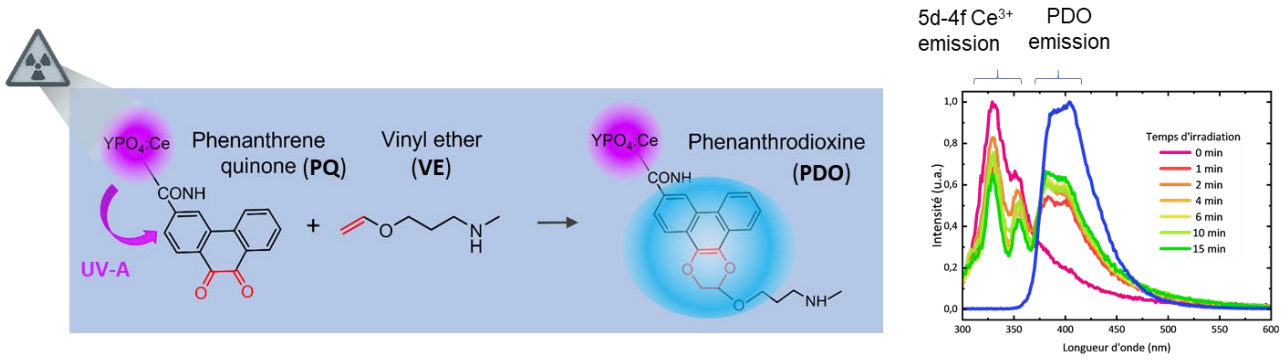


*Figure 1: Objective: triggering the biorthogonal photoclick reaction between phenanthrenequinone (PQ) and a vinylether (VE) to yield phenanthrodioxine (PDO) using a nano-scintillator emitting in the UV-A spectral range (left) and photoluminescence spectra obtained after various irradiation times of $YPO_4$:Ce nanoparticles grafted with PQ in a solution containing VE.*

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