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Bioanalytical applications of Raman spectroscopy to follow active pharmaceutical and cosmetic ingredients

Development of novel pharmaceutical and cosmetic formulations is an important domain of biomedical research, both at academic and industrial scale. Including active pharmaceutical ingredients (API) or active cosmetic ingredients (ACI) within the forms composed of many components is intended to protect their activity from degradation upon storage and/or to improve their delivery to the site/organ of action. Consequently, it is important to follow the API or ACI qualitatively (at molecular state) and quantitatively (in terms of total quantity/concentration and relative spatial distribution) at different steps: (i) before, during and after formulation and (ii) after administration, in cells, tissues and/or fluids.
Among analytical techniques appropriate for these tasks, few are as versatile and flexible as Raman spectroscopy which is known to enable a non- invasive analysis *in situ*, with both high molecular/structural specificity and satisfactory accuracy for quantification. In addition, macroscopic, microscopic and remote probing through optical fibers Raman measurement modalities are available and thus are applicable in various contexts, from R&D to process analytical technology (PAT). The present talk will illustrate the use of Raman-based bioanalytical approaches in the domains of pharmaceutical [1,2], bio-pharmaceutical [3,4] and cosmetic [5,6] domains, starting from quality control before and after formulation and going to the API/ACI release and delivery to cells and tissues.

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