Squaraine dyes as fluorescent turn-on probes for the detection of proteins

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Over the recent years, great efforts have been devoted to developing of new probes able to noncovalently bind and detect specific proteins identified as important biomarkers of several diseases.
Among the different fluorescent probes, squaraines are characterized by sharp and intense absorption and emission in the visible up to the NIR region, but in aqueous environments tend to form aggregates that lead to fluorescence quenching therefore limiting their wide applications. Despite this drawback, squaraine dyes are proved to turn on their fluorescence in response to a biological target thanks to aggregation-induced emission (AIE) phenomenon, finding promising application for living processes, medical diagnosis and biological imaging at the molecular, cellular and organism level [1,2].
To date, several techniques have been developed to detect proteins; among them, fluorometric assays gained increasing attention thanks to their convenience, simplicity, non-invasive monitoring capability and usability in biological samples, leading to a simultaneously increasing in developing new dyes able to non-covalently bind specific proteins for their detection.
In this contribution, the interaction in aqueous media between different proteins (i.e Human Serum Albumin (HSA) and Porcine Gastric Mucin (PGM)) and several squaraines with different substitutions have been investigated by using UV–Vis, circular dichroism and fluorescence spectroscopies. The goal of the work is to understand how squaraines behave in presence of different proteins with the idea to identify a structure-activity relationship for the design of more effective and selective fluorescent dyes.

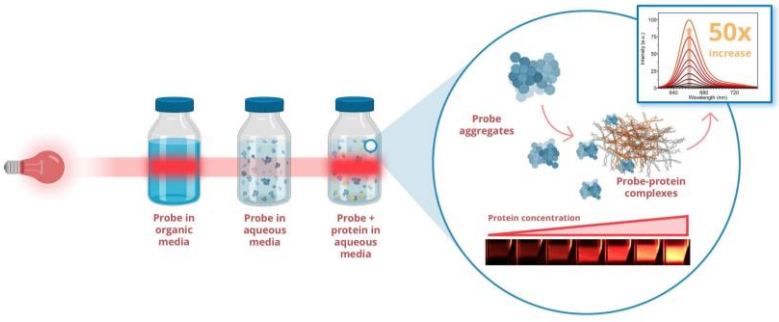

Figure 1. Turn-on phenomenon of probes in presence of proteins.

References

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