Tao, K., Yoskovitz, E., Adler-Abramovich, L., Gazit, E.
Optical property modulation of Fmoc group by pH-dependent self-assembly. ***RSC Advances***; 2015: 5, 73914-73918.

Abstract: The modification of short peptides with the 9-fluorenylmethyloxycarbonyl group (Fmoc) results in a very efficient self-assembly propensity of these building blocks. Nevertheless, the influence of self-organization on the optical properties of the Fmoc group per se is still not fully understood. We envision that Fmoc-modified 5-aminopentanoic acid (Fmoc-5), which has similar molecular dimensions to the highly studied Fmoc-diphenylalanine peptide, could serve as a simple non-peptide model that possesses inherently good self-organization properties without amide-backbone contributions. Herein, we demonstrate that Fmoc-5 molecules self-assemble to form plate-like crystals at pH 2.0, where Fmoc groups are mainly organized in anti-parallel arrangements and form 2-D quantum-well confined structures (2-D QW), exhibiting a dominant fluorescent emission peak at 324 nm and a step-like absorbance from 260 to 300 nm. At pH 10.0 Fmoc initially exhibits its inherent optical properties, since Fmoc-5 hydrolyses and cleaved Fmoc groups self-assemble to form nanovesicles which further coalesce with each other, a new emission peak at 467 nm and a quasi-continuous absorbance emerges and dominates in fluorescence and UV-vis absorption, respectively. Our findings suggest that the optical properties of Fmoc could be modulated through pH-dependent self-assembly.