# *Self-organization of patchy rod-like particles*

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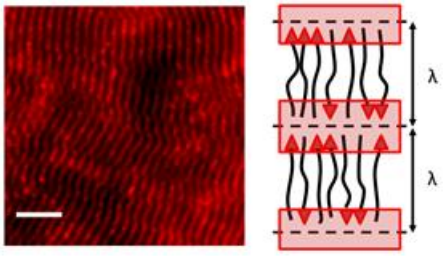
Rod-like particlessuch as tobacco mosaic viruses and *fd* viruses motivate a strong interest in soft condensed matter as a model system of colloidal particles due to their high monodispersity in size and their high aspect ratio. By tuning the concentration of *fd* viruses in aqueous suspension, several liquid crystalline phases can be formed: isotropic, chiral nematic, smectic and columnar states.The self-organization of these viral particles has been shown to map the hard rod behaviorfor which the interaction potential is purely repulsive.




Fluorescence microscopy image of viruses functionalized at one of the end by redchromophores and self-organized in smectic phase; scale bar represents 5 µm (left). Schematic representation of two smectic layersformed by semiflexible rods with dyes (red triangulars) on their tip (right).

Thanks to a regio-selective chemistry, we were able to specifically functionalize one end of these viruses with fluorescent dyes which act as hydrophobic patches and therefore induce directional attractive interaction between rods. Specifically, the virus tip attraction induced by this labeling results in the extension of smectic phase range.

Structural and dynamical properties ofvirus suspensions exhibitingthese patchy inclusions,are investigated and recent results on X-ray scattering and optical microscopy experiments at the single particle scale will be presented.

1. Lars Onsager, Ann. N.Y. Acad. of Sci., 51, 627–659, 1949.
2. Eric Grelet, Physical Review X, 021053, 2014
3. Eric Grelet and RichaRana, Soft Matter (asap), 2016