Neues Denken. Neue Materialien.

INM COLLOQUIUM

"SELF-ASSEMBLY OF CdSe NANOPLATELETS INTO TWISTED THREADS"

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INM, Campus D2 5, Leibniz-Saal
Host: Prof. Dr. Tobias Kraus

Colloidal CdSe nanoplatelets are light emitting materials which exhibit outstanding optical properties[1,2]. They are considered to be excellent candidates for many applications in nanotechnology due to their fast fluorescence lifetime and their small spectral linewidth. One of the current challenges is to self-assemble these colloidal quantum wells into large ordered structures to control their collective optical properties. We describe a simple and robust procedure to achieve controlled face-to-face self-assembly of CdSe nanoplatelets into micron-long polymer-like threads made of up to ~1000 particles.
These structures are formed by addition of oleic acid to a stable colloidal dispersion of platelets, followed by slow drying and re-dispersion. We could control the average length of the CdSe nanoplatelet threads by varying the amount of added oleic acid. Since they are composed of a single platelet in their lateral dimension, these structures are highly flexible. Furthermore, they continuously break and reform in solution.[3] In some case, we show that the threads twist and yield chiral structures with a given handedness. We propose a mechanism based on the release of stress imposed by the ligand at the surface of the platelet to explain this twisting phenomenon. [4]

References

[1] Ithurria, S.; Tessier, M. D.; Mahler, B.; Lobo, R. P. S. M.; Dubertret, B.; Efros, A. L. Nature Materials 2011, 10 (12), 936.
[2] Ithurria, S.; Dubertret, B. Journal of the American Chemical Society 2008, 130 (49),
[3] Jana, S.; Davidson, P.; Abécassis, B. Angewandte Chemie International 2016, 55 (32), 9371.
[4] Jana, S.; De Frutos M, Davidson, P.; Abécassis, B, Science Advances, 2017, 3, e1701483.

You are invited to have coffee with the speaker 15 minutes before the talk starts.