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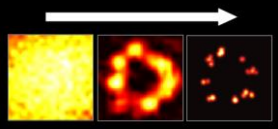

Monday | March 22, 2021 | 16:00

MINFLUX nanoscopy and related matters

I will show how an in-depth description of the basic principles of diffraction-unlimited fluorescence microscopy (nanoscopy) [1-3] has spawned a new powerful superresolution concept, namely MINFLUX nanoscopy [4]. MINFLUX utilizes a local excitation intensity minimum (of a doughnut or a standing wave) that is targeted like a probe in order to localize the fluorescent molecule to be registered. In combination with single-molecule switching for sequential registration, MINFLUX [4-6] has obtained the ultimate (super)resolution: the size of a molecule. MINFLUX nanoscopy, providing 1–3 nanometer resolution in fixed and living cells, is presently being established for routine fluorescence imaging at the highest, molecular-size resolution levels. Relying on fewer detected photons than popular camera-based localization, MINFLUX nanoscopy is poised to open a new chapter in the imaging of protein complexes and distributions in fixed and living cells.

[1] Hell, S.W., Wichmann, J. Breaking the diffraction resolution limit by stimulated emission: stimulated-emission-depletion fluorescence microscopy. Opt. Lett. 19, 780-782 (1994).
[2] Hell, S.W. Far-Field Optical Nanoscopy. Science 316, 1153-1158 (2007).
[3] Hell, S.W. Microscopy and its focal switch. Nat. Methods 6, 24-32 (2009).
[4] Balzarotti, F., Eilers, Y., Gwosch, K. C., Gynnå, A. H., Westphal, V., Stefani, F. D., Elf, J., Hell, S.W. Nanometer resolution imaging and tracking of fluorescent molecules with minimal photon fluxes. Science 355, 606-612 (2017).
[5] Eilers, Y., Ta, H., Gwosch, K. C., Balzarotti, F., Hell, S. W. MINFLUX monitors rapid molecular jumps with superior spatiotemporal resolution. PNAS 115, 6117-6122 (2018).
[6] Gwosch, K. C., Pape, J. K., Balzarotti, F., Hoess, P., Ellenberg, J., Ries, J., Hell, S. W. MINFLUX nanoscopy delivers multicolor nanometer 3D-resolution in (living) cells. (bioRxiv, doi: https://doi.org/10.1101/734251)

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