Approaching the limit: Multiplexed Super-Resolution Microscopy with DNA-PAINT and Exchange-PAINT

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Super-resolution fluorescence microscopy is a powerful tool for biological research, but obtaining multiplexed images for a large number of distinct target species remains challenging. Here we use the transient binding of short fluorescently labeled oligonucleotides (DNA-PAINT, a variation of point accumulation for imaging in nanoscale topology) for simple and easy-to-implement multiplexed super-resolution imaging that achieves sub-10-nm spatial resolution in vitro on synthetic DNA structures.

We report a multiplexing approach (Exchange-PAINT) that allows sequential imaging of multiple targets using only a single dye and a single laser source. We experimentally demonstrate ten-color super-resolution imaging in vitro on synthetic DNA structures as well as four-color two-dimensional imaging and three-color 3D imaging of proteins in fixed cells.