

DMD BASED ADAPTIVE STRUCTURED ILLUMINATION MICROSCOPY FOR REDUCED PHOTOBLEACHING

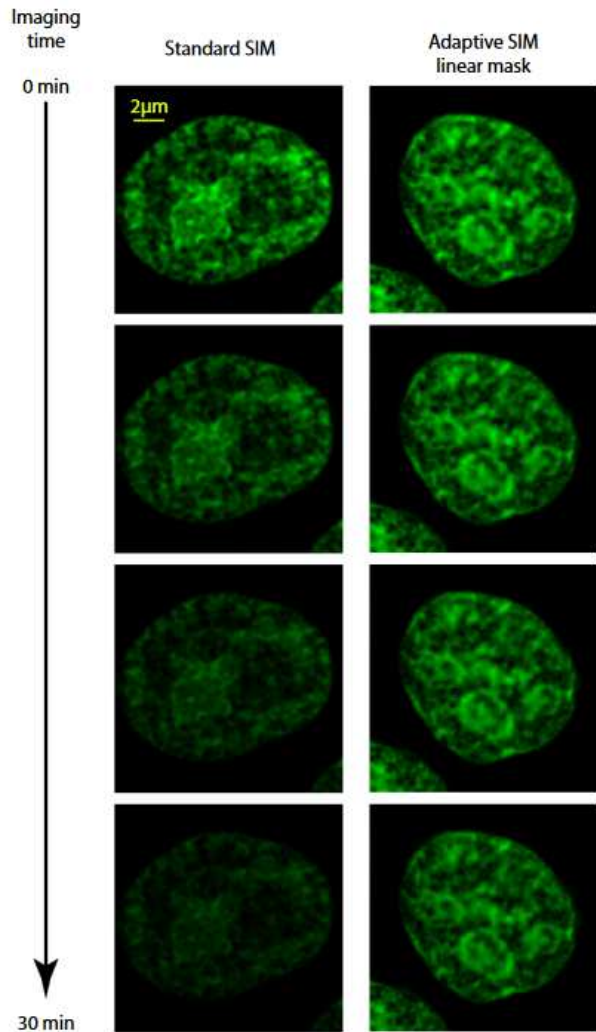
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Photobleaching and phototoxicity is a major problem in fluorescence microscopy, in particular for live cell imaging. These issues can be mitigated by locally adjusting the illumination intensity dose based on the sample structure, as has been demonstrated for confocal microscopy [1] and for the Programmable Array Microscope (PAM) [2]. In our presentation we extend this to Structured Illumination Microscopy (SIM). We show SIM using a Digital Micromirror Device (DMD) based setup. This enables full control over the illumination pattern. An initial widefield acquisition is used to generate an illumination mask that is used in a subsequent multi-spot grid SIM acquisition to locally modulate the height of the peaks in the scanned spot grid. We show a reduction in photobleaching with a factor of three.

Comparison of the photobleaching induced by 30 min time lapse imaging between standard SIM (left) and adaptive SIM (right). Images taken from ref. [3].



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- [2] W. Caarls et al., J. Microsc. Vol. 241, 101, 2011.
- [3] N. Chakrova et al., Biomedical Optics Express, 10, 4263, 2016.