QUALITY CONTROL OF MODERN FLUORESCENCE MICROSCOPES

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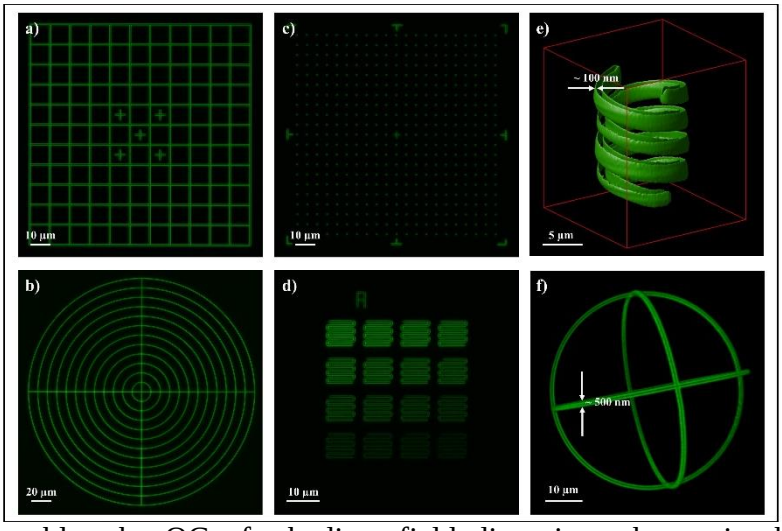
Although quality control (QC) of fluorescence microscopes is a topic that appeared more than fifteen years ago in academic laboratories [1] and national regulatory agencies [2], it is still topical as it was for example in the program of the Core Facility Satellite Meeting of the 15th international ELMI meeting in 2015. Due to the increasing complexity of the instrumentation used for confocal and wide-field fluorescence microscopy, national metrology institutes [3], microscope manufacturers [4], and core facilities [5] have gotten involved in identifying, making and/or testing different tools, both hardware and software, to assess the numerous aspects of fluorescence microscopes. Indeed, QC is important: (i) for core facilities, to assure the performances of the microscopes they make available to the end users; (ii) for microscope manufacturers, to guarantee the microscopes' specifications and to improve maintenance; (iii) for end users to remove the bias introduced by the microscopes in their experiments.



We have developed a new process that enables the etching of long-term stable fluorescent patterns (*cf.* figure on the left) with sub-micrometer sizes in 2D and 3D inside glass. Based on this new process, fluorescent patterns and dedicated image analysis algorithms are shown to be suitable for complete and quick QC of fluorescence microscopes [6]. Non-exhaustively, this new solution enables the QC of: shading, field distortion, chromatic shifts, lateral and axial resolving powers, system intensity and spectral responses, stage repositioning accuracy, etc.

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