

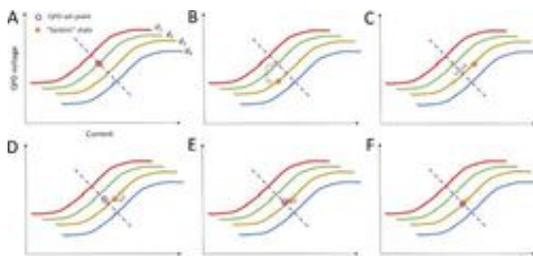
Technology Offer

Autofocus-control of a microscope including an electrically tunable lens

Reference Number 03-00459

Challenge

In optical microscopy maintaining a sample in focus remains a critical challenge: mechanical and thermal fluctuations as well as thermal instability of the microscope body all contribute to focus drifts. These can disrupt routine time lapse imaging, single molecule imaging and super resolution microscopy, even over short periods. To oppose these inevitable fluctuations it is important to use automatic focal plane detection and stabilization systems within a closed loop system. The following technology provides for the first time a true closed-loop autofocus system using an electrical tunable lens (ETL) where an ETL coupled to the microscope objective readjusts the focal position presenting a fast and cost effective all-optical autofocus solution.



Implementation of focal plane correction using a tunable lens.

Technology

The implementation of a closed loop feedback circuit for the auto focus system is based on displacement detection with an integrated laser beam combined with a quadrant photodetector (QPD). The autofocus system adjusts the focal plane by a set-point prediction which allows taking into account also the changes in QPD voltage which arise whenever a new current is applied to the lens. To convert the difference between the measured QPD voltage and the set-point into a focal change of the ETL, the system is calibrated beforehand.

Commercial Opportunity

The technology is available for in-licensing.

Development Status

Proof of concept has been demonstrated.

Patent Situation

A European priority claiming patent application was filed in 2017.

Further Reading

Bathe-Peters, M., Annibale, P., Lohse, M. All-optical microscope autofocus based on an electrically tunable lens and a totally internally reflected IR laser. *Optics Express* 26, (3) 2359-2368 (2018).