



Image courtesy of Prof. Dr. Periklis Pantazis

OPTICAL FILTER DESIGNS

SPLIT-FILTERS – A NEW APPROACH FOR IN-VIVO LABELING OF SINGLE CELLS

To convert a normal confocal microscope into a confined primed conversion microscope one needs a special split-filter. AHF has licensed this filter from ETH and can offer you these filters with high optical properties.

Background: Confined primed conversion of photoactivatable or photo-switchable proteins is a new method (US Patent No. 61/804,064) to label single cells or cellular substructures *in vivo*^[1]. Photo-switchable fluorescent proteins are regularly used in biological research to follow dynamic processes. Usually, they are switched from a green to a red fluorescent state (for example Den-

dra-, Eos-, Maple/ClavGR, KikGR- and KAEDE proteins). For this switching the proteins need to be excited with UV light. With the new microscopy method, called 'confined primed conversion' it is also possible to switch them with a combination of red and blue light^[2].

This approach has two advantages: The phototoxic UV light can be eliminated and with the confinement by the new technique one can switch single cells or even cellular substructures. Furthermore, it is possible to follow neuromorphology^[3] and to perform optogenetics on single cells^[4].

[1] Labeling cellular structures *in vivo* using confined primed conversion of photoconvertible fluorescent proteins. *Nature Protocol*, Vol. 11 No. 12, pp. 2419-2431, M.A. Mohr, P. Argast, P. Pantazis, 2016

[2] *in vivo* single-cell labeling by confined primed conversion. *Nature Method*, Vol. 12 No. 7, pp. 645-648, W.P. Dempsey, L. Georgieva, P.M. Helbling, A.Y. Sonay, T.V. Truong, M. Haffner, P. Pantazis, 2015

[3] Single neuron morphology *in vivo* with confined primed conversion. *The Zebrafish*, Vol. 133 4th edition, chapter 6, pp. 125-138, M.A. Mohr, P. Pantazis, 2016

[4] Optogenetic control with a photocleavable protein, PhoCl. *Nature Method*, Vol. 14 No. 4, pp. 391-394, W. Zhang, A. W. Lohman, Y. Zhuravlova, X. Lu, M. D. Wiens, H. Hoi, S. Yaganoglu, M. A. Mohr, E. N. Kitova, J. S. Klassen, P. Pantazis, R. J. Thompson, R.E Campbell, 2017