The 14th Conference on Methods and Applications in Fluorescence

MAF 14

Würzburg, Germany I 13-16 September 2015

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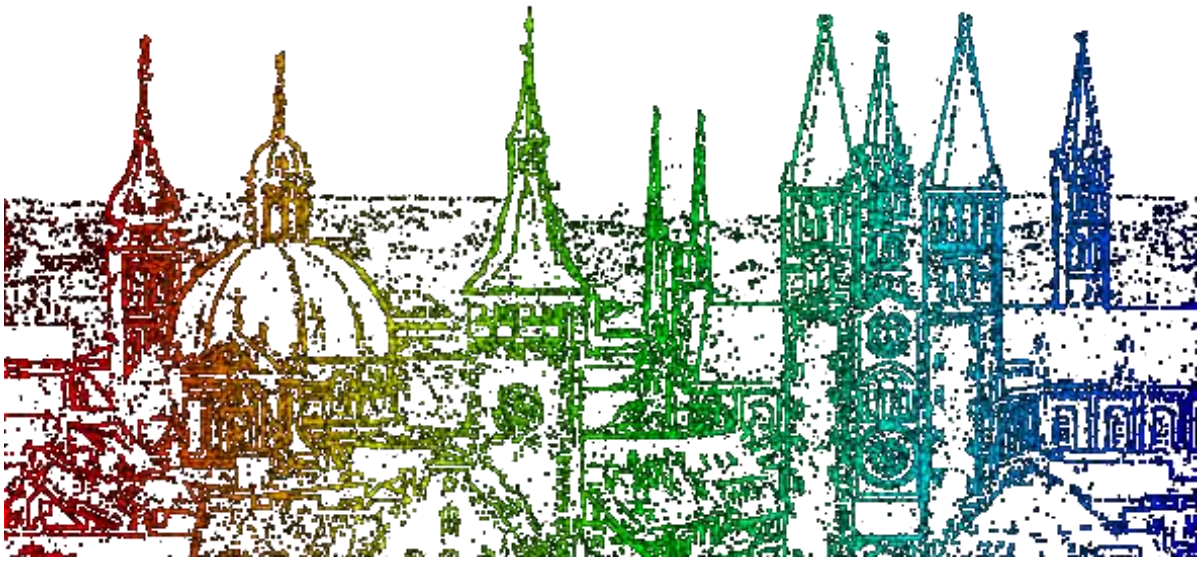

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Welcome

Dear participants of the 14th MAF,

We are very happy to welcome you to the **14th Conference on Methods and Applications in Fluorescence** in Wuerzburg, Northern Bavaria, Germany. This year in Wuerzburg we expect a well-attended meeting with delegates coming from all over the world. We are glad to host you at the Congress Center Wuerzburg (CCW) located in the center of the city with an unrivaled view on the fortress “Festung Marienberg” and the old bridge “Alte Mainbrücke”.

The series of biannual MAF conferences started in 1989 in Graz, Austria. MAF conferences are intended to reflect the enormous progress that has been made in fluorescence which is one of the most powerful spectroscopic and imaging methods. The progress is mainly driven by exciting new developments in super-resolution microscopy, lifetime spectroscopy, imaging (including microscopy), and probe design, but also in nanomaterials (including beads and thin films), opto-electronic components, in data acquisition and processing. By now, fluorescence has found widespread applications in life sciences where it complements (and competes with) NMR and MS, but with an entirely different scope.

MAF conferences bring together speakers, contributors, attendants and exhibitors from areas including physics, chemistry, (bio)analytical sciences, biology, medicine, pharmacy (including high-throughput screening), materials sciences, and opto-electronics. Thus, MAF conferences reflect - in a unique way - the multidisciplinarity of fluorescence, and at the same time promote scientific cross-talk in the word's best meaning.

This conference would not be possible without the generous help of many exhibitors. We would like to especially mention the support by ATTO-TEC, PCO, HORIBA and IOP Publishing as the main sponsors of the conference.

We hope that you have both, a scientifically exciting meeting and a pleasant stay in Wuerzburg.

Markus Sauer

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About the Cover

Logo designed by Marina Sauer and implemented by Dr. Sebastian van de Linde, University Wuerzburg, Germany.

Viscosity Sensitive Dyes for Determining the Rheological Properties of Hydrogels in Biological Tissues

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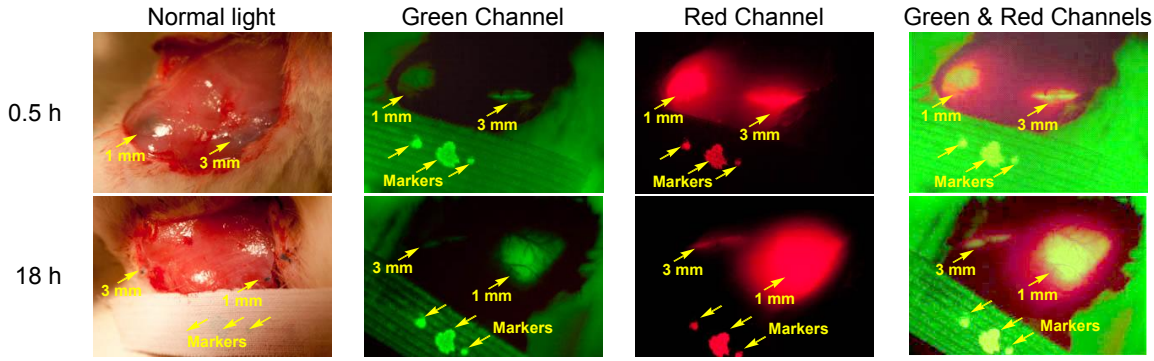
Biodegradable hydrogels are widely used in medicine as surgical implants e.g. to prevent heart aneurysms during the post-infarction period, as fillers to eliminate defects in bones and as dressings for plugging burns and deep, infected wounds. They are also used in clinical pharmacology as transport systems for targeted delivery of drugs, as well as for many other medical, veterinary and biological applications. An important task therefore is visualization of hydrogels and determination of their rheological properties. However current fluorescence based methods utilizes only the viscosity insensitive dyes and therefore these methods do not allow differentiating the dense (viscous) hydrogel and its degradation products to obtain important information on the localization of hydrogel of different rheological state.

In this work we use the viscosity sensitive dyes **Seta-470** and **Seta-560** (*SETA BioMedicals*) on their own and in combination with viscosity insensitive dye **Seta-650** to monitor an alginate hydrogel and its rheological state in the leg of a rat and the rat myocardium. The dyes were covalently bound to alginate and the fluorescently stained hydrogel was implanted in biological tissues.

We demonstrate that the viscosity sensitive dyes enable monitoring of the dense hydrogel implanted in biological tissues and in combination with viscosity-insensitive dye allow differentiating the dense and biodegraded hydrogel. The figure below represents images of the rat leg with alginate hydrogel stained with **Seta-470** and **Seta-650** in 0.5 h and 18 h after implantation in the depth of 1 mm and 3 mm. The images were obtained in normal light and in fluorescence mode using the green channel (emission of **Seta-470**, a 470-nm LED, 470/10 nm BP excitation filter, 546/20-nm BP emission filter), and the red channel (emission of **Seta-650**, a 636-nm LED, 640/10 nm BP excitation filter, 670-nm LP emission filter), and the combined green and red channels. While the images in the red channel exhibit localization of stained alginate independently of its rheological state, the images in the green channel visualize only dense hydrogel. The combination of the green and red channels images enables localization of both the dense as well as the degraded hydrogel.



Alginate hydrogel stained with **Seta-470** and **Seta-650** in 0.5 h and 18 h after implantation in the depth of 1 mm and 3 mm in the leg of a rat

An advantage of viscosity sensitive dye **Seta-560** over **Seta-470** is its longer-wavelength excitation and emission, which are favorable for imaging of biological tissues.

The work was supported by the Science and Technology Center in Ukraine (project P548) and the National Academy of Sciences of Ukraine (project 0113U001410).