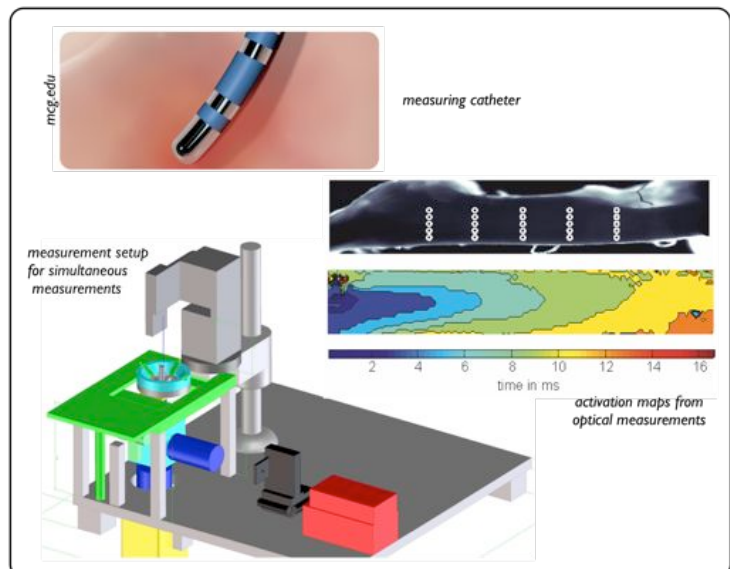


# Simultaneous fluorescence optical and electrical characterization of atrial tissue

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Atrial fibrillation is a frequent and serious cardiac arrhythmia. The major risks for patients with atrial fibrillation are embolism and stroke. For diagnosis and treatment of atrial fibrillation catheter measurements of cardiac electrophysiology are a widely used technique.

In the electrophysiological procedure a catheter with several electrodes is brought inside the atria via the venous system. By placing the electrodes at the atrial walls electrical activity of cardiac cells is measured. However there is evidence that pressure applied on cardiac cells and the capacity of the catheter electrode are influencing their electrophysiological behavior. Until today this effect is not quantified sufficiently. In this project a measurement setup will be developed to investigate the influence of a catheter measuring electrode on atrial electrophysiology by simultaneous fluorescence optical and electrical measurement of cardiac cell membrane voltages. For optical measurements the dye Di-4-ANEPPS will be used. This dye couples to cell membranes and changes its emitted light spectrum linearly with transmembrane voltage. By measuring these spectral changes using a CCD-camera transmembrane voltages can be extracted. To record extracellular voltages a miniaturized catheter model will be used, which will be similar to clinical measurement catheters. For a precise positioning in relation to the tissue the catheter will be connected to a micromanipulator.



Research aims in this project are to quantify the influence of a catheter electrode on atrial electrophysiology and to include the results into more realistic computer models. Furthermore effects occurring during ischemia and fibrosis will be investigated.

## Publications

- J. P. Thiele Optische und mechanische Messungen von elektrophysiologischen Vorgängen im Myokardgewebe. Dissertation, 2008
- J. P. Thiele, O. Dössel. Fast optical recording of membrane potential in rat trabecular muscle with a triggered CCD-system: a preliminary study. Gemeinsame Jahrestagung der Deutschen, der Österreichischen und der Schweizerischen Gesellschaft für Biomedizinische Technik (51), 2006