

Doctoral School of Information and Biomedical Technologies  
Polish Academy of Sciences  
(TIB PAN)

**Subject: Stimuli-responsive polymer hydrogels for the regeneration of post-infarction myocardium (detailed title will be clarified as a result of the PhD student-supervisor interaction)**

**Discipline:** biomedical engineering

**Supervisor:** prof. dr hab. Paweł Sajkiewicz, psajk@ippt.pan.pl

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**Description:** Myocardial infarction is one of the leading causes of heart failure. The lack of blood supply to the cardiac tissues leads to the massive death of cardiomyocytes. The rapid wound healing process in the infarcted area forms fibrosis instead of functional cardiac tissue, ventricular remodeling and a loss of contractility follow the wound healing. These processes cause the loss of heart function, which can lead to end-stage heart failure. One of the very promising procedures for the myocardium post-infarction regeneration is based on the use of injectable hydrogels. The subject of the work concerns research on the possibility of regeneration of post-infarction myocardium using stimuli-responsive polymer hydrogels, the cross-linking of which takes place at an elevated temperature after injection into the damaged area. The hydrogels will also serve as a carrier for stem cells, which should differentiate into myocytes in situ under appropriate conditions. An important element will be the introduction of nanofibers into the hydrogels, providing adequate mechanical support and/or transmission of electrical signals.

**References:**

Hussein M. El-Husseiny, Eman A. Mady, Walaa A. El-Dakroury, Ahmed S. Doghish, and Ryou Tanaka, *Stimuli-responsive hydrogels: smart state-of-the-art platforms for cardiac tissue engineering*, *Front. Bioeng. Biotechnol.* 2023; 11: 1174075.