

## Thermoresponsive star polymer surfaces as systems for gene therapy

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### Abstract

Efficient and controlled delivery of nucleic acids by viral and synthetic carriers with low toxicity is one of the most important challenges facing the gene therapy. Nonviral vectors are perfect candidates for this goal because the use of viral vectors have a high risk of inducing unwanted immune responses. For medical applications, a use of nanostructured polymers every year brings more and more possibilities. The creation of new polymers and the study of their biocompatibility is very important to find better and safer vectors for gene therapy. In this work we compared conventional transfection and deposition transfection performed with the use of cationic star polymer. Obtained polyplexes were tested for cytotoxicity and luciferase activity using HT-1080 cells as a model. One of the solutions to increase transfection efficiency seems to be the deposition of the nucleic acid itself or its polyplex on solid support. The support used for the purpose is functioning as a substrate supporting the organization and differentiation of cells, while immobilized DNA or RNA delivers significant genetic information into the cells. The major advantages of the immobilization of nucleic acid/polyplexes include the direct contact of polymer layer loaded with the nucleic acid with the cells during the proliferation. The performed studies demonstrated that we obtained the novel effective system, based upon star polymer architecture, which is potentially useful for gene delivery. This work was supported by the Polish National Science Center contract no. UMO-2015/17/B/ST5/01095.

### Speaker Publications:

1. "Poly(2-oxazoline) Matrices with Temperature-Dependent Solubility—Interactions with Water and Use for Cell Culture"; June 2020 *Materials* 13(12):2702 DOI: 10.3390/ma13122702
2. "Conditions for isolation and culture of cells obtained from abdominal aortic aneurysm (AAA) from patients treated surgically" April 2020
3. "Functional star polymers as reagents for efficient nucleic acids delivery into HT-1080 cells" January 2020 *International Journal of Polymeric Materials* DOI: 10.1080/00914037.2020.1716227
4. "Synthesis, Characterization and Cytotoxicity of Novel Thermoresponsive Star Copolymers of N,N'-Dimethylaminoethyl Methacrylate and Hydroxyl-Bearing Oligo(Ethylene Glycol) Methacrylate" November 2018 *Polymers* 10(11):1255 DOI: 10.3390/polym10111255

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### Biography:

Agnieszka Fus-Kujawa has completed her Masters at the age of 24 years from University of Silesia in Katowice and has started her doctoral studies from Medical University of Silesia in Katowice in Department of Molecular Biology and Genetics. She is the assistant and has opened her doctoral thesis on March 2019. She has published in journals with Impact Factor and actively participates in scientific Conferences.