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RESEARCH AREA

Biocompatible materials such as polymers, gels, and biomatrices are increasingly used for biomedical and pharmaceutical applications. Polymers are macromolecules composed of repeating monomer units, and nowadays, monomers naturally present in the human body (such as amino acids) are often employed. This approach helps reduce or even eliminate the body's immune response. To create functional, insoluble, crosslinked polymers, molecules capable of forming crosslinks between long polymer chains are required, resulting in a three-dimensional network structure. These polymer networks are shape-stable yet flexible and can absorb and retain large amounts of liquid, similar to living tissues or the extracellular matrix (ECM), which provides structural support essential for healthy cell growth and function. Using the electrospinning technique, fibrous meshes composed of nano- and microscale fibers can be produced from polymer solutions under a high-voltage electric field. The chemical composition, elasticity, biodegradability, and active agent or nanoparticle content of these fibrous structures can be widely adjusted, allowing their properties to be tailored for specific biomedical purposes, such as wound dressings, tissue engineering scaffolds, or drug delivery systems.

TECHNIQUES AVAILABLE IN THE LAB

Various electrospinning devices, infrared spectroscopy equipped with an ATR head, modulus tester for tensile strength measurements, UV-VIS spectrophotometer, scanning electron microscopy, in vitro biocompatibility and biodegradability tests, antibacterial assays, and cytotoxicity studies using cell cultures.

SELECTED PUBLICATIONS

Horvath, Z., Juriga, D., Juhasz, G. A., Domokos, J., Szabo, D., Juriga-Toth, K., Salvati, A., **Jedlovszky-Hajdu, A.** (2025). Biological effect of Zn-loaded polysuccinimide nanofibers on cells and bacteria. **J Mol Liq 417**.

Juhász, Á. G., Nanys, M., Pinke, B., Fadel, A., Godzierz, M., Juriga-Tóth, K., Molnár, K., Juriga, D., & **Jedlovszky-Hajdú, A.** (2024). Formation of Three-Dimensional Polysuccinimide Electrospun Fiber Meshes Induced by the Combination of CaCl2 and Humidity. **Macromol Rapid Commun 45(7):** e2300625.

Pázmány, R., Nagy, K. S., Zsembery, Á., **Jedlovszky-Hajdu, A.** (2022).Ultrasound induced, easy-to-store porous poly(amino acid) based electrospun scaffolds. **J Mol Liq 359**.

Veres, T., Voniatis, C., Molnár, K., Nesztor, D., Fehér, D., Ferencz, A., Gresits, I., Thuróczy, G., Márkus, B. G., Simon, F., Nemes, N. M., García-Hernández, M., Reiniger, L., Horváth, I., Máthé, D., Szigeti, K., Tombácz, E., & **Jedlovszky-Hajdu, A.** (2022). An Implantable Magneto-Responsive Poly(aspartamide) Based Electrospun Scaffold for Hyperthermia Treatment. **Nanomaterials (Basel) 12(9):** 1476.

Molnar, K., Voniatis, C., Feher, D., Szabo, G., Varga, R., Reiniger, L., Juriga, D., Kiss, Z., Krisch, E., Weber, G., Ferencz, A., Varga, G., Zrinyi, M., Nagy, K. S., & **Jedlovszky-Hajdu, A.** (2021). Poly(amino acid) based fibrous membranes with tuneable in vivo biodegradation. **PloS One 16(8):** e0254843.