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Production of the polyurethane/zeolite nanocomposites with electrospinning method for biomedical engineering applications

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Polyurethane (PU) is one of the most popular and broadly used synthetic polymers due to its endurance, elasticity, fatigue resistance, biocompatibility and acceptance-tolerance in the body. On the other hand zeolites are aluminosilicate crystals with micro-sized porous structures. Thermally and chemically zeolites are more stable compared to the polymers. Furthermore, zeolites were reported having anti-bacterial, anti-viral effects and anti-fungal effects inside the body and on the skin. Therefore, their direct usage in biomedical application with an accompanying polymer, which includes carrier properties, may be promising. This study focuses using the electrospinning method to fabricate PU nanofibers, which enhanced by zeolite crystals. Electrospinning is a simple, effective and low cost technique, which produces both nano and micro sized scaffolds. As the results of this technique final products becomes improved with the advantages of nanotechnology. For instance, maximizing the surface to unit volume ratio is done to achieve better mechanical properties due to their very small diameter. The PU/Zeolite nanocomposite fibers were prepared in different blend ratios in order to analyze the different parameters. Each individual sample was characterized by SEM, XRD, IR and tensile measurements. Zone inhibition tests were performed in order to detect the antimicrobial activity and cell viability studies were also performed. Results indicated that PU/zeolite nanocomposite is not only more biocompatible but also has better physical properties than pure PU. Moreover, it allows the normal development and growth of cells and exhibits antimicrobial effect against bacterial strains. This nanocomposite structure is promising for their potential usage and value in biomedical engineering applications.

Biography

Mehmet Onur Aydogdu has completed his Bachelor's degree from the Department of Biology at Marmara University. He is working at Advanced Nanomaterials Research Laboratory at Marmara University. He is interested in biology, biomaterials, design and applications of nanofiber structures for drug delivery and controlled release systems.

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