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Development of polyhydroxyalkanoate-based biomaterials for bone tissue regeneration

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Bio polymers represent one of the leading sectors for bio-based products and their expected growth is foreseen to be significant within the next years. Polyhydroxyalkanoates (PHAs), a class of optically active biodegradable polyesters, are accumulated by numerous bacteria, they are non-toxic and degrade to harmless products. PHAs are excellent bio compatible materials due to the lack of toxicity in contact with human tissue and blood. Development of new composite materials for bone tissue engineering is a constantly growing field of medicine. Therefore there is a continuous need in creating novel materials that can not only regenerate the defected tissue but also nourish it while the healing process progresses.

Here we present a concept of 3D ceramic-polymer scaffolds prepared from one of the representatives of medium chain length polyhydroxyalkanoates, with possibility to use them in regeneration of hard tissue. Two different materials for bone tissue regeneration were prepared: a series of macroporous ceramic composites coated with modified as well as unmodified PHA polymer. We present their morphology along with physicochemical and biological characteristics.

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Biography

Maciej Guzik graduated from Jagiellonian University in Kraków, Poland with MSc in environmental protection in 2008. Next, he'd undertaken a structured PhD programme at University College Dublin in Ireland. During that time he had been specialised in high cell density fermentation development, downstream and upstream processing of polyhydroxyalkanoates (PHAs), and also genetic manipulation of bacteria. In 2012 he presented thesis entitled "Conversion of postconsumer polyethylene to biodegradable polymer polyhydroxyalkanoate" and successfully graduated from UCD with PhD in industrial microbiology. In the following years he worked in a UCD spin out company Bioplastech, where he was developing fermentation strategies for PHA production. He was also a lead on a project aiming at production of small molecules arising from PHA. In 2015 he moved back to Kraków, his home town, and become a fellow at J. Haber Institute of Catalysis and Surface Chemistry PAS. Here he is a PI of several projects in area of production and application of polyhydroxyalkanoates.

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