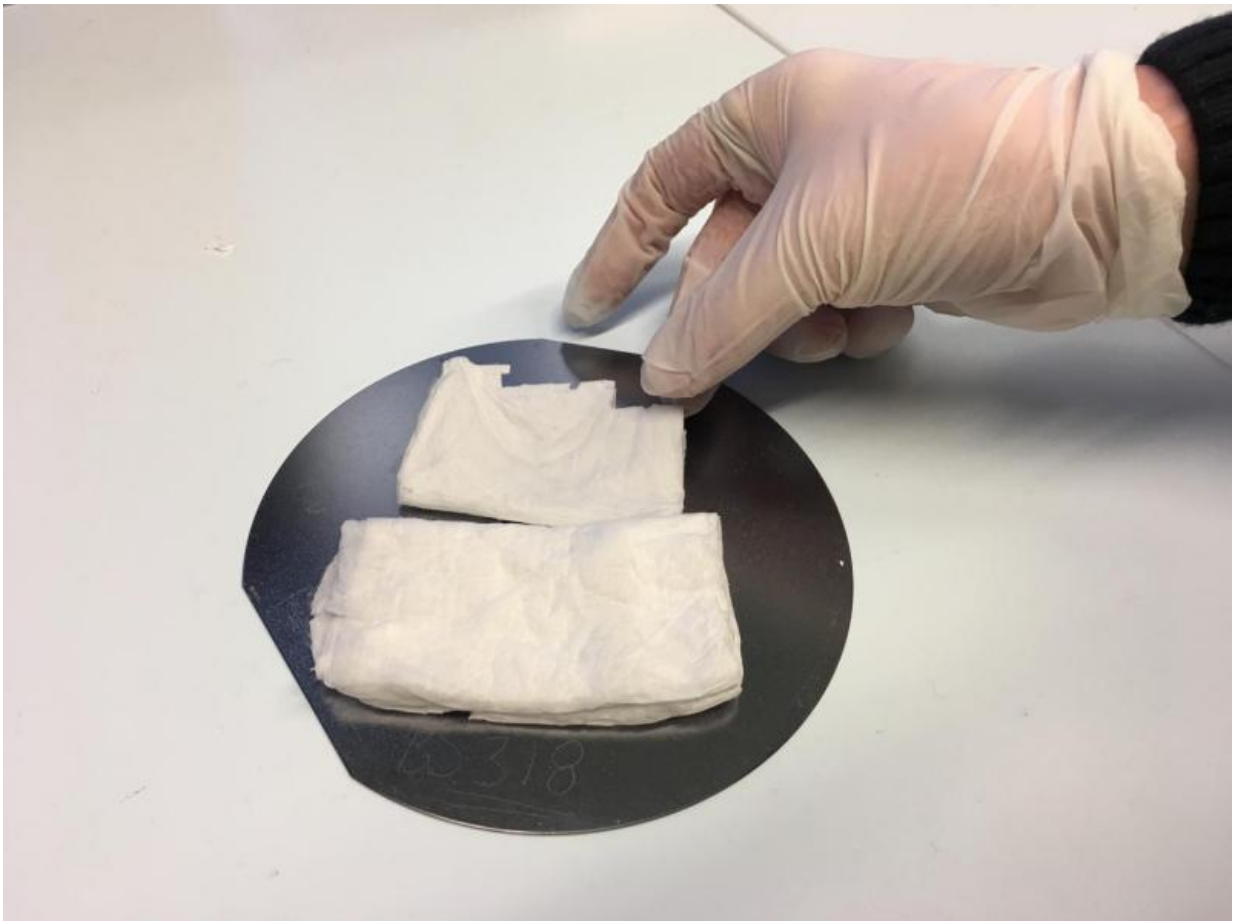


Nanofibres developed for healing bone fractures

January 18 2017



Hydroxyapatite nanofibre film produced at the University of Helsinki. Credit: Riitta-Leena Inki

In the future, it may be possible to use nanofibres to improve the attachment of bone implants, or the fibres may be used directly to scaffold bone regeneration. This would aid the healing of fractures and may enable the care of osteoporosis. This is detailed in a new dissertation.

In his doctoral research, Jani Holopainen of the Department of Chemistry at the University of Helsinki has developed processes for fibrous and thin-film biomaterials that can be used as scaffolding for [bone regeneration](#) and in other [bone](#) implants. He also studied the apparatus used for nanofibre production.

Synthetic bone-like material

"At best, bone-reforming scaffolds that regenerate at the same rate as bones could be used as implants. The scaffolds activate the [bone cells](#) to generate new bone that slowly replaces the disintegrating scaffold and the implant exits the body naturally without separate removal surgery," Jani Holopainen says.

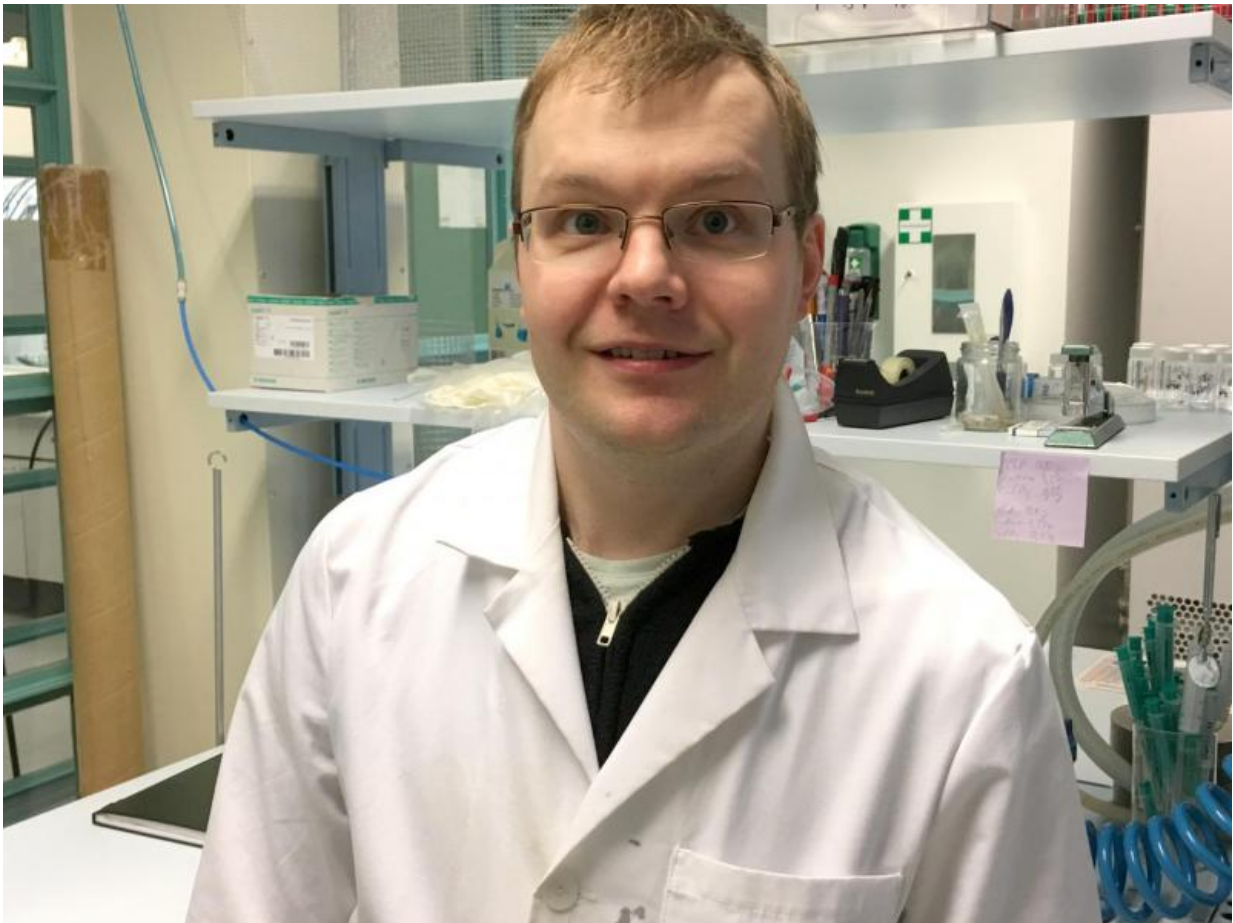
Holopainen selected hydroxyapatite, the main component of the [bone mineral](#), as the focus of his research. This is why the synthetic hydroxyapatite structures he has developed are very compatible with bone.

Prototypes manufactured in Helsinki

Holopainen developed the electrospinning apparatus for producing hydroxyapatite fibres and a new kind of needleless twisted wire electrospinning setup, which is more productive than the generally known electrospinning method. The prototypes for the equipment used in the research were manufactured at the Department of Chemistry at

the University of Helsinki. The equipment will have to be developed further in order to enhance production to an industrial scale.

"This promising method still has a long way to go before it will become a real medical application, though cellular tests have already been made," says Professor Mikko Ritala of the Department of Chemistry and the Atomic Layer Deposition centre of excellence at the University of Helsinki, who was the advisor of the doctoral research.



Jani Holopainen has studied bone implants and developed bone-regeneration scaffolds from nanofibers. Credit: Riitta-Leena Inki

More information: Bioactive Coatings and Fibers for Bone Implants and Scaffolds by Atomic Layer Deposition, Electrospinning, Solution Blow Spinning and Electroblowing:

helda.helsinki.fi/handle/10138/169566

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