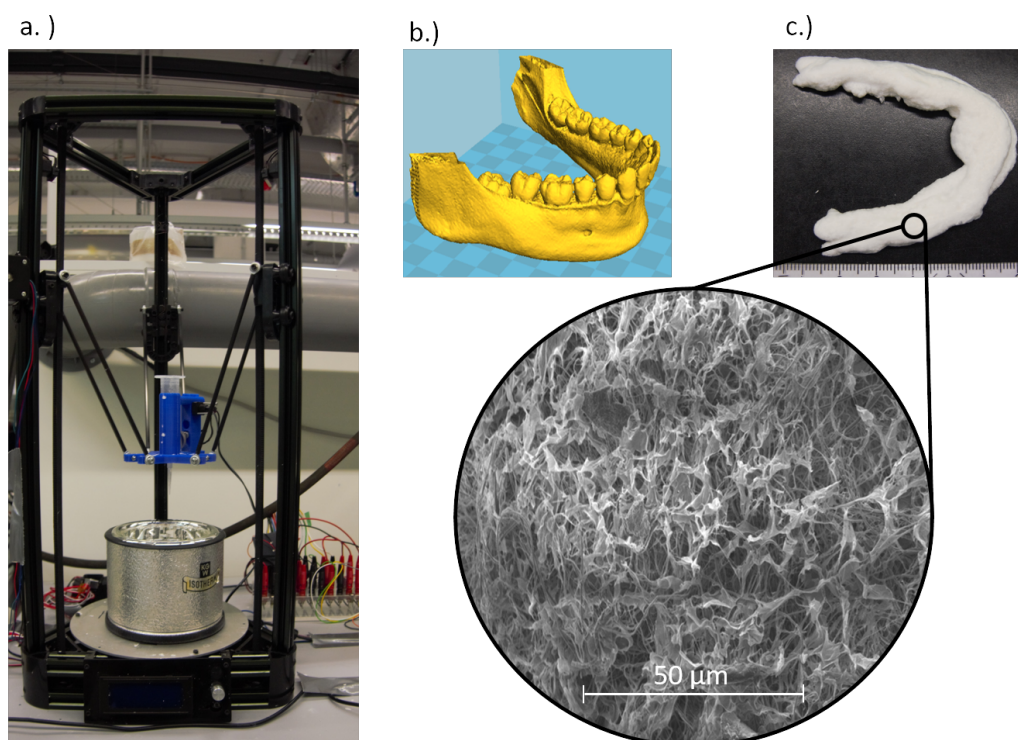


Cryo 3D printed nanofiber based aerogels

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The preparation of 3D sponges or aerogels from electrospun nanofibers was recently reported [1]. These freeze-casting based technologies allow the control of pore sizes and mechanical properties [2], but are restricted to casted geometries. We therefore developed a 3D printing platform for the preparation of nanofiber based aerogels. Polyacrylonitrile (PAN) nanofiber suspensions in water were used as printing material. Printing was done with a modified commercially available 3D printer (Afinibot, MicroDelta) which was equipped with a custom-made printing head hosting the suspending device. Here we describe the printing resolution, printing in 2D and the printing capabilities were described. Furthermore several cylindrical objects were printed and compared with their freeze-casted counterparts regarding mechanical properties and morphology. Moreover the influence of additives used in the printing process was investigated. For a future application as tissue scaffolds a model of a jawbone was successfully printed from a 3D model. Scanning Electron Microscopy confirmed porosity and nanostructure of the printed scaffold.



a.) Printing setup including the custom-made printing head. b.) 3D image of a jawbone to be partially printed. c.) Printed sample of a nanofiber aerogel jawbone with SEM image confirming individual nanofibers.

[1] Yang Si, Jianyong Yu Xiaomin Tang, Jianlong Ge Bin Ding, *Nature Communications*, **2014**, 5:5802

[2] Fabian Deuber, Sara Mousavi, Marco Hofer, Christian Adlhart, *Chemistry Select*, **2016**, 1, 5595-5598