Chitosan hydrogel containing bioactive glass aiming at3D printing for tissue engineering

Larissa Ribeiro Lourenço[1], Roger Borges[2], Danilo Justino Carastan[3], Monica Beatriz Mathor[4], Juliana Marchi[1]

[1]Universidade Federal do ABC (*CCNH*) , [2]Faculdade Israelita de Ciências da Saúde Albert Einstein (*School of Biomedical Engineering*) , [3]Universidade Federal do ABC (*CECS*) , [4]Instituto de Pesquisas Energéticas e Nucleares (*CETER*)

e-mail: r.larissa@ufabc.edu.br

3D printing is a rising processing technique in tissue engineering due to high reproducibility and the possibility of complex or even patient-specific models. Chitosan is a promising biomaterial for both 3D printing and tissue engineering, because of its biocompatibility, rheological properties, biodegradability, and cost-effectiveness. Bioactive glasses can help the regeneration of different biological tissues and act as reinforcement for chitosan matrix. In this work, chitosan hydrogels were produced with different concentrations of 58S bioactive glass (0.5 up to 5%wt). For the rheological characterization, frequency, and recovery experiments were carried out. Printability and shape fidelity were evaluated during the 3D printing process. Indirect cytotoxicity assay using Balb/c 3T3 cells was performed to evaluate the biological properties of the scaffolds. The presence of the glass maintained the viscosity properties and increased the recovery percentage. All materials formed filaments and allowed printing with suitable form maintenance. Biological experiments showed high cell viability for all 3D scaffolds, even though a reduction was observed for higher glass concentrations. The results indicate that the studied materials are printable and potentially recommended for tissue engineering applications.