Polish-Israeli Conference on Electrospinning and Tissue Engineering

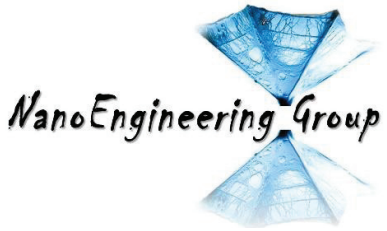
Programme and Abstracts

04 - 05 October 2018

Warsaw, Poland

Organizers

Laboratory of Polymers & Biomaterials at Institute of Fundamental Technological Research Polish Academy of Sciences (IPPT PAN) based on the fundamental knowledge in the area of polymer physics, materials science, chemistry and biotechnology, focuses its recent activity on biomaterials for tissue engineering. Great part of our activity is related to polymeric biodegradable scaffolds, mostly formed by electrospinning as nanofibrous structures, both for tissue regeneration and materials for controlled drug release.



Nano Engineering Group at Technion Israel Institute of Technology is focused on research in the field of molecular engineering of soft matter. The particular activities are related to the electrospinning including optimization of the parameters of the process, deep understanding of the fundamental physical facets of electrospinning as well as designing a composite materials for tissue engineering applications.

Objectives

The goal of PICETE conference is to bring together experts from around the world in order to exchange their knowledge, experience and research innovation in the basics of the electrospinning and the broad area of biomedical materials covering topics related to designing, fabrication, characterisation and tissue engineering applications.

The conference will include the following topics:

- Fundaments of electrospinning
- Optimization of electrospinning
- Properties of electrospun nanofibers
- Functionalization of electrospun nanofibers
- Electrospun nanofibers as scaffolds for tissue engineering/drug delivery systems
- Current trends in designing of polymeric biomaterials for tissue engineering/drug delivery systems

Polymerization shrinkage of biomaterials

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Abstract

Composite light-cured materials appeared in the 90's. From this moment, we are looking for a worthy replacement for amalgam, which should be functional and aesthetic. Dentists using light-cured composite materials for restoration and teeth repair expect a product with many advantages: properties similar to tooth tissues, fast application technique, good durability and protection against secondary caries [1,2]. The dental composites include a resin which reduces its volume during polymerization process[3].

In this study, the new method of polymerization shrinkage was applied to evaluate the volumetric and linear shrinkage of selected materials. Determination of linear and volumetric shrinkage correlation was tested.

Materials used in this study were:

- Flow-Art (Arkona) - 38% wt. of Bis-GMA, UDMA, TEGDMA and Bis-EMA) and 62% wt. of fillers (BaAl-Si glass and nanosilica), marked as "FA shade" (shade = A1, A2 or A3, FIG. 1A),
- Flow-Color (Arkona) - the same composition as above + pigments, marked as "FC colour" (colour = orange, yellow, blue, green, violet and pink, FIG. 1B),
- Charisma Opal Flow (Heraeus), which was composed of Bis-GMA resin and about 58% wt. of fine inorganic fillers (BA-Al glass and silica). Marked as "CHA-A1", FIG.1C.

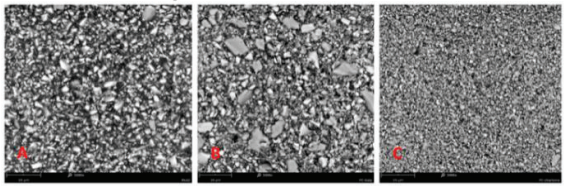

FIG 1. SEM microstructures: A-Flow-Art, B-Flow-Color, C- Charisma.

Volumetric shrinkage measurements was conducted using microCT Skyscan 1174 (Bruker microCT) with accuracy of 6.5 µm. Volume of composite's drop was measured assuming it is a body of revolution, formed by rotation of half of its cross-section. A drop of composite (volume of about 3 mm^3) was placed on tip made of PE (d = 3 mm).

5 images were taken in different angle position (0, 45, 90,135 and 180°). In next step composite was cured using Cromalux 75 halogen lamp with special limiter. After curing and additional time of 1 min (dark polymerization) another set of 5 images were taken in appropriate angular position.

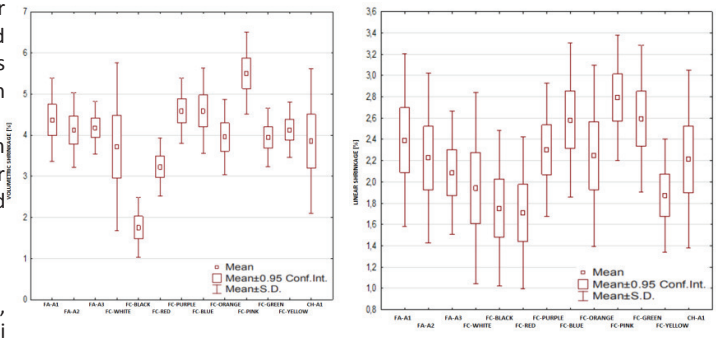

FIG 2. Volumetric and linear shrinkage of tested materials.

Conclusions

The tests showed that the polymerization shrinkage does not depend of the type of matrix material. Differences in the shrinkage results of FC materials and FA materials is from the presence of pigments which can affect the absorption of light and can also change the chemical properties of the resin. The influence of material composition on polymerization shrinkage was demonstrated.

References

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Biography

I am assistant in Laboratory of Polymers&Biomaterials, Institute of Fundamental Technological Research, Polish Academy of Sciences. The main topic of my interest are new biomaterials for tissue engineering and regenerative medicine, especially, piezoelectric nanofibers.

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