

Experimental resin-based composites with alternative fillers

Zuzanna Buchwald, Mariusz Sandomierski and Adam Voelkel

Poznan University of Technology, Poland

The most widely used polymeric matrix for dental restorative materials is based on the photopolymerizable methacrylic resins, mainly Bis-GMA (bisphenol A diglycidyl dimethacrylate), so called Bowen's resin. The second main component of resin-based composites (RBC) is inorganic filler, which is responsible for the minimizing of the polymerization shrinkage, maximizing the mechanical strength, as well as other crucial properties. Despite the fact that many commercial solutions are present in the market of dental materials, none of them is perfect. Therefore, attempts are still made to design and characterize new groups of restoratives. Promising results were obtained on the basis of the research conducted for experimental RBCs containing calcium phosphates fillers, mainly hydroxyapatite. The second interesting alternative for siliceous fillers is aluminosilicates, e.g. zeolites. The results have shown that these types of materials are promising substitute for classical fillers. Our actual research concerns the application of modified zeolites forms the active filler in dental composites, showing new beneficial properties, e.g. improvement of mechanical strength and curing effectiveness, as well as bioactive effect. This work was produced with the financial support from the Polish National Science Centre (grant no. UMO-2015/17/B/ST8/02388).

References:

1. Z Okulus, T Buchwald, M Szybowicz and A Voelkel (2014) Study of a new resin-based composites containing hydroxyapatite filler using Raman and infrared spectroscopy. *Mater Chem Phys.* 145:304-312.
2. Z Okulus, T Buchwald and A Voelkel (2016) Calcium release from experimental dental materials. *Mater Sci Eng C.* 68:213-220.
3. Z Okulus and A Voelkel (2017) Mechanical properties of experimental composites with different calcium phosphates fillers. *Mater Sci Eng C.* 78:1101-1108.
4. M Sandomierski, Z Okulus and A Voelkel (2018) Active diazonium-modified zeolite fillers for methacrylate-based composites. *Comp Interf.* 25:1-15.
5. Z Okulus, M Sandomierski, M Zielińska, T Buchwald and A Voelkel (2019) Zeolite fillers for resin-based composites with remineralizing potential. *Spectrochim Acta A Mol Biomol Spectrosc.* 210:126-135.

Biography

Zuzanna Buchwald is a Research Assistant in the Department of Organic Chemistry at Poznan University of Technology, Poznan, Poland. She has completed her PhD in Chemistry in 2017. She is interested in the widely understood materials science for dental applications. Her research is focused on the preparation and characterization of new composite materials for potential restorative applications. Her current research interests are also tooth hard tissues characterization, inverse gas chromatography and spectroscopy, especially the application of these methods in the biomaterials research. She has published 16 papers in SCI journals concerning mainly the characteristics of experimental dental composites with calcium phosphates fillers, recently also with zeolites fillers, characterization of tooth hard tissues and application of Raman spectroscopy and inverse gas chromatography in dental materials research.

zuzanna.buchwald@put.poznan.pl