Dental composites are used to reconstruct damaged dental tissues. Unfortunately, the complex oral environment can cause some phenomena that decrease the quality of the restoration. Materials used in dentistry are exposed to a wide range of chemical, physical, mechanical and biological agents. In addition, these factors will depend on the person, their habits and overall health. The progressive degradation of the composite material and bonding system ultimately leads to a necessary replacement of the dental restoration. Unfortunately, repairing the dental restoration may result in sensitivity of the surrounding tooth tissues or the need for more complicated prosthetic treatment.

It was observed that restorations need to be replaced after 5-6 years. It was calculated, based on evaluation of approximately 100 000 clinical outcomes, that probability of survival of composites restoration for seven years is 92 % . On the other hand, surveys reported overall success of small to moderate-sized composite restorations in long-term performance - 10+ years. The ageing process of dental composites is an inherent element of usage of these materials in oral cavity. Main reasons of composite restorations replacement are: fracture, secondary caries and wear.

A composite material to successfully enter the market, it must meet certain requirements. The ISO 4049 standard specifies methods for the evaluation. Unfortunately, there is no protocol in this standard for prediction the long-term behavior of dental composite material in a dynamically changing oral environment. In addition, in the literature there are many research on the ageing processes of composite materials but there is no approach to standardize artificial aging protocol. It is essential to identify procedure to determine the ageing process of dental materials, which will be accurate to simulate ageing in mouth.

Based on the literature review on the aging processes of composite dental materials, some preliminary aging protocols were selected. The aim of the project is to evaluate the influence of selected aging procedures on:

1. flexural strength, diametral tensile strength and hardness,
2. composites microstructure characterization,
3. fatigue strength.

We hope that our study will lead to a validation of artificial aging protocol which will be useful in evaluation of composite clinical performance for both research and industrial institutions.