Features of using different equipment to prepare tooth enamel for EPR dosimetry

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The chemical treatment is a widespread method of the sample preparation in EPR dosimetry using tooth enamel. Treatment of the teeth in alkali solution using ultrasound cleaner removes dentin and organic component of enamel, thus reducing the native signal and, therefore, increasing sensitivity. However, the properties of the enamel samples prepared using different chemicals and equipment can vary. The enamel of the molar human teeth was used to compare the qualities of the preparation procedures in ISS and IMP laboratories. In IMP two different ultrasound cleaners were used. The protocols of sample preparation are similar in the two laboratories. The donors of the teeth were villagers of the non contaminated regions of the Chelyabinskaya oblast in Russia. All teeth were extracted in dental clinics due to medical purpose. The 5M NaOH solution treatment in ultrasound bath was used. The treatment times varied from 0 to 20 hours. It was found that samples prepared at ISS show an evident decrease of the mass normalized native signal with the treatment duration. For the samples prepared at IMP using low power ultrasound cleaner, the amplitude of the native signal shows a sharp decrease after 5 hours of treatment and it is constant after this time. At the same time, these samples demonstrate higher native signal per mass unit after 15 h treatment than ISS treated samples. Implication of these results on the quality of the EPR spectrum will be discussed.

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