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# INFRARED SPECTROMETRY ANALYSIS OF THERMALLY TREATED SILICON FOR FABRICATION OF NANOCAPACITORS

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Silicon nitride nanocapacitors have an important role in micro- and nano-electronical devices to be employed under action of ionizing radiation. Infrared spectrometry has been applied for monitoring the product radiation stability [1]. However, additionally to the impact of ionizing radiation, the thermal effects need to be taken into account. The impact of thermal effects on the chemical bonds has been recently estimated for the thin films on the Si containing surfaces, however, the estimation of the substrate long term stability is still required. Therefore, in the present research the stability of the chemical bonds in Si substrates was analysed.

The selected Si wafers, as satellite samples were treated analogous to the ones used in the fabrication process of the thin films [3]. After preparation Si samples were heated up to 150 °C at a rate of 10 °C/min, held at 150 °C for 8 hours and allowed to cool down to room temperature (one heating cycle). After each of the heating cycles, the Fourier transform infrared (FTIR) spectra were measured. Up to 3 FTIR measurements for each sample. A total of 33 heating cycles were performed. The FTIR measurements were performed with a *Bruker Vertex 70v* spectrometer equipped with an attenuated total reflection module.

In the FTIR spectra the main signal occurs at 600–630 $cm^{-1}$, corresponding to Si-Si asymmetric vibrations [4]. The variations of the signal intensity are used to determine the thermal stability of the Si structures. The slope of the signal at 610 $cm^{-1}$ shows to less than 0.1% changes over the 264 h cyclic heating tests, signifying the stability of the thin films. The obtained results will be used for further development of the nanocapacitors with improved dielectric layers.

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