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In situ high-temperature infrared emissivity spectroscopy of silicate glasses and glass-ceramics[1] CRISTIANE N. SANTOS, DOMINGOS DE SOUSA MENESES, VALERIE MONTOUILLOUT, PATRICK ECHEGUT, CEMHTI - CNRS, Universite d Orleans, Orleans, France — Glasses and glass-ceramics are materials of widespread application in industry, building, photonics, microelectronics and medicine. Glass-ceramics are obtained by controlled glass crystallization, and many efforts have been done in the last years to better understand the structural changes occurring in this process. Here we show that in situ infrared emissivity spectroscopy is also a suitable technique for this purpose and a wide spectral and temperature range could be accessed (25-16000 cm^{-1} and 400-1700 K, respectively). We use a home-made instrument composed of two spectrometers, and a CO_2 laser for locally heat the glass samples up to the melt. A dielectric function model was applied to fit the experimental data and compute the materials optical properties. We show that using new decomposition procedure quantitative information on the distribution of the Q^n tetrahedral units (n being the number of bridging oxygen) can be obtained. The results at room temperature are in good agreement with recent molecular dynamics simulations. The major changes occur during quartz crystallization, with a remarkable increase of Q^4 units.

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