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Microwave sintering of dental ceramics

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The use of ceramics in dentistry, and across the biomedical field, has been increasingly improving and expanding in the last years. Improvements in quality, versatility and mechanical properties have played a crucial role in the expansion of the indications and purposes of these materials in dentistry and many other fields. While much research to improve ceramics has been focused in the modification of the chemistry of the materials, the processing methods has not been dramatically modified in the last years. Sintering, a key process of the production of dental ceramics, has remained relatively unmodified over the years. Microwave sintering, a technology which is common for industrial settings (communications, industrial drying and heating), it is suitable for dental ceramics. The advantages of a volumetric heating reduce dramatically the processing times, and therefore, the energy consumption. The technology is easily adaptable and available in most of the markets, with a lot of possibilities for engineering a new generation of devices. The use of microwave sintering not only reduces the processing costs, as time and energy savings, but also offers a very attractive "side-effect": the improvement of mechanical properties of the material, leading to an extension of the service life, which has a huge impact in the clinical performance for the patient. In this presentation, we will show the main characteristics of the process, and we will present the qualitative and quantitative results of our sintering protocols designed for dental ceramics processed using microwaves.

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