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Properties of Lithium Disilicate Glass-ceramic Obtained from Rice Husk Silica

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Objectives: Lithium disilicate glass-ceramic used as dental prosthesis and glasses based on the $\text{Li}_2\text{O-SiO}_2$ system has been investigated by substitution of the commercial high-purity SiO_2 (Fluka) by silica obtained from rice husk.

Methods: Powder mixtures based on stoichiometric composition of $66\text{SiO}_2:33\text{Li}_2\text{O}$ (in mol%), were melted and glasses were obtained. The effect of the SiO_2 substitution on phase formation, microstructure, cytotoxicity and chemical property were determined and discussed. Investigations were carried out by means of differential thermal analysis; X-ray diffractometry, X-ray fluorescence (for comparison between rice husk and high-purity SiO_2 powders), cytotoxicity analysis and scanning electron microscopy.

Results: Amorphous and transparent glasses were obtained after melting. These glass-ceramics, presented T_g near to 480°C and crystallization peak at 660°C , in both compositions and $\text{Li}_2\text{Si}_2\text{O}_5$ as crystalline phases after heat-treatment. The cytotoxicity analysis show that both material, lithium disilicate with high-purity and rice husk silica, not presented cytotoxicity behaviour. The X-ray fluorescence analysis showed that the rice husk silica has high-purity, despite present oxide iron in greater proportion than commercial high-purity silica, what can leads to color alterations.

Conclusions: Still without glass crystallization, the biological effects are going in a satisfactory way. The analysis will be repeated for the crystallized glasses. The substitution of high-purity commercial silica by rice husk silica is a quite promising technique for dental prosthesis of lithium disilicate. The CNPq (Brazil), by the process 142994/2009-0, supports this work realization.

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