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Influence of Calcination Temperatures on the Morphology and Specific Surface Area Development of $\text{ZrO}_2\text{-CeO}_2\text{-Y}_2\text{O}_3\text{-Al}_2\text{O}_3$ Powders Obtained via Sol-Gel Route

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Abstract. BACKGROUND: Doped with metal oxide, zirconia is one of the most currently used ceramics for making a wide range of all-ceramic restorations in dental prosthetics. Its use entails very good mechanical properties and the possibility of obtaining a desirable aesthetic effect of manufactured prostheses.

OBJECTIVE: The main purpose/aim of this study was to investigate the influence of calcination temperature on the morphology and specific surface area development of a $\text{ZrO}_2 - \text{CeO}_2 - \text{Y}_2\text{O}_3 - \text{Al}_2\text{O}_3$ powder system obtained with a humid-free sol-gel process.

METHODS: Powders were obtained by the sol-gel method in an inert gas atmosphere at ambient temperature using, for this purpose, zirconium n-propoxide. Morphology was examined by scanning electron microscopy (SEM), and specific surface area was investigated with full-adsorption isotherms in nitrogen with a Brunauer-Emmett-Teller model (BET).

RESULTS: Depending on the calcination temperature, different morphologies and surface areas were observed. With an increase in temperature, grain growth was observed.

CONCLUSIONS: The influence of calcination temperature on morphology and specific surface area of the as-obtained powders was clearly evidenced.

Keywords: zirconia, prosthetic dentistry, sol-gel, calcination, morphology, BET

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