

[54] PROCESS FOR PREPARING CERAMICS COMPOSITE SINTERED BODIES

[75] Inventors: Yasunobu Horiguchi, Kamagaya; Nobuyuki Yamamoto, Edogawa; Tuyoshi Goto, Kawasaki, all of Japan

[73] Assignee: Lion Corporation, Tokyo, Japan

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[58] Field of Search 501/12, 5, 10, 63, 95, 501/32, 72, 73

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Primary Examiner—Mark L. Bell

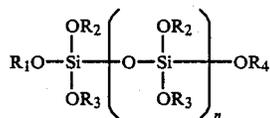
Assistant Examiner—Karl Group

Attorney, Agent, or Firm—Burns, Doane, Swecker and Mathis

[57] ABSTRACT

A process for preparing a glass or glass-ceramic composite sintered body by a sol-gel method comprises reacting

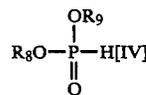
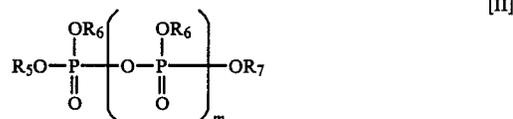
(A) at least one silicic acid ester represented by the general formula (I).



wherein R₁ to R₄ are each hydrogen or a group repre-

sented by Chd xH_{2x+1}(OC₂H₄)_y— wherein x is 1 to 5, and y is 0 to 10, provided that R₁ to R₄ are not all hydrogen at the same time, and n is 0 to 20;

(B) at least one phosphorus compound represented by the general formula (II), (III) or (IV):



wherein R₅ to R₉ are each hydrogen, an alkyl group having 1 to 5 carbon atoms, a phenyl group or an aralkyl group having 7 to 10 carbon atoms, and m is 0 to 10; and

(C) at least one compound selected from the group consisting of calcium salts and calcium compounds represented by the general formula (V)



wherein R₁₀ represents an alkyl group having 1 to 5 carbon atoms; with water in the presence of the following component (D-1) and/or the following component (D-2) to form a gel, and drying, molding and then sintering the gel;

(D-1): at least one kind of ceramics fine particles having a composition different from a sintered body obtained from components (A) to (C) or having a crystal different from crystals formed in the sintered body,

(D-2): ceramic short fibers and/or whiskers.

SiO₂-P₂O₅-CaO glass or glass-ceramic composite sintered body contains at least one of ceramics short fibers and/or whiskers, and at least one of ceramics fine particles.

According to the invention, there can be obtained composite sintered bodies of calcium phosphate glasses or glass-ceramics exhibiting excellent in biocompatibility in which ceramics fine particles, ceramics fibers and whiskers are uniformly dispersed and mixed, and strength, toughness and scatter of strength are effectively improved.

Thus the composite sintered bodies of the invention are widely applicable as materials for hard tissue of living bodies such as artificial tooth roots and artificial bones.