sufficiently low viscosity of the resin solution. On the other hand, it is not practicable to operate at a temperature above about 59° C. as indicated by the vertical dashed line **145**, since above this temperature the casting time exceeds the pot life of the resin system. A preferred temperature of operation is therefore about 50° C. at which temperature the viscosity of the resin solution is well below 1,500 centipoises and the casting time is appreciably less than the pot life of the resin solution. The controlling parameters for satisfactory impregnation of any porous ceramic body include the viscosity of the resin solution, which is preferably below about 1,500 centipoises as discussed above; the wetting of the ceramic body by the resin solution; the pore size in the ceramic body which in accordance with the present invention is preferably in the range from about 0.5 micron to about 50 microns radius; the size distribution of the pores in ceramic body; and the temperature of the ceramic body at the time of impregnation, a too low temperature prematurely cooling the resin solution to raise the viscosity thereof to an unworkable value before impregnation is complete and a too high temperature causing premature completion of the solidifying reaction of the resin solution whereby to shorten the pot life to a value less than the casting time required to place the resin solution throughout the pores of the ceramic body.

In those cases wherein the size and/or shape of the prosthetic parts indicates that suitable impregnation cannot be obtained because of the parameters set forth above and graphically illustrated in FIG. 14, various changes in the design of the prosthetic part may be made. Referring to FIG. 12 of the drawings, there is shown a hip prosthesis **120** which has had the basic structure thereof modified to facilitate impregnation by a resin solution which is more viscous than that illustrated in Example 2 above. More specifically, the hip prosthesis **120** has had a channel **129** formed interiorly thereof and disposed substantially centrally thereof and extending from the outer surface of the head **121** through the neck **122** and the enlarged portion **126** and substantially to the opposite end of the associated shank **123**. The lateral dimension of the channel **129** is greatest at the point thereof where it intersects the surface of the head **121** and gradually decreases in cross section toward the opposite end thereof. Preferably the channel **129** is formed by placing a polyethylene core in the green body prior to the firing thereof and the green body is then fired in a non-oxidizing atmosphere after which it is fired in an oxidizing atmosphere to remove the polyethylene core by burning. After final firing of the hip prosthesis **120**, the resin solution is introduced thereinto while the part **120** is at ambient temperature through the channel **129** whereby the resin flows outwardly from the channel **129** toward the outer surface of the hip prosthesis **120** including the surface **124** of the head **121** and the surface **127** of the shaft **123**. Since the resin solution is warmer when it is first introduced into the channel **129**, the resin quickly flows outwardly throughout the pores to the head **121** completely to fill the passages and pores therein. In the shank **123** on the other hand, the resin will be cooled while moving through the channel **129** and as a consequence the volume **123***a* along the outer surface of the shank **123** will not be filled with resin but will remain as open pores for accepting the growth of body tissue thereinto for incorporation of the hip prosthesis **120** into the associated femur. The channel **129** will be completely filled by the resin as indicated at **129***a* and, accordingly, the surface **124** of the head **121** will be smooth with no open pores therein while the shank **123** will have open pores along the surface **127** thereof in the area designated by the numeral **123***a* in FIG. 12.

Two specific methods of providing pores in the surface of a resin impregnated porous ceramic body have been described heretofore, namely, the leaching of the resin from the surface by means of a suitable solvent such as methylene dichloride when impregnating with an epoxy resin, and the use of a special design of the prosthetic part so that certain portions of the surface thereof are not impregnated as described above with respect to FIG. 12. Yet other methods of providing pores in the surface of the composite material may be utilized such as the oxidation or burning of the resin from the outer surface, the ceramic body being highly resistant to oxidation. Another method of forming pores on the surface of the composite material is to impregnate the area **123***a* in FIG. 12 with a material, such as a hard wax which is soluble in a liquid petroleum, prior to impregnation with the epoxy resin through the channel **129**. Subsequently the epoxy resin will fill all the pores in the hip prosthesis **120** except those designated by the numeral **123***a*. After the epoxy resin introduced through the channel **129** has been cured, the wax in the area **123***a* can be dissolved away using the solvent therefor, thereby providing open pores for accepting the growth of body tissue thereinto.

It will be seen that there have been provided improved prosthetic parts and improved materials therefor and methods of making the same which fulfill all of the objects and advantages set forth above. Although certain preferred examples of the invention have been given for purposes of illustration, it will be understood that various changes and modifications can be made therein without departing from the spirit and scope thereof and it is intended to cover in the appended claims all such changes and modifications which fall within the scope of the present invention.

What is claimed is:

1. A prosthetic part for incorporation into the muscular-skeletal system of an animal, said part comprising a body, and structure on said body for attaching said part to the muscular-skeletal system of an associated animal, said body and said attaching structure being formed of a ceramic having a plurality of open cells distributed uniformly therethrough and interconnected to form passages extending from each area therein to other and remote areas therein and to and terminating in pores at the surface thereof, said ceramic being inert to animal fluids and being of a character such that the body tissues of the associated animal will grow thereupon and in contact therewith and into said pores.

2. A prosthetic part for incorporation into the muscular-skeletal system of an animal, said part comprising a body, and structure on said body for attaching said part to the muscular-skeletal system of an associated animal, said body and said attaching structure being formed of a ceramic, at least a portion of the surfaces of said body and said attaching structure having pores therein, said pores having radii in the range from about 0.5 to about 50 microns and constituting from about 6% to about 75% of the surface area of said body and said attaching structure, said ceramic being of a character such that the body tissues of the associated animal will grow thereupon and in contact therewith and into said pores.

3. A prosthetic part for incorporation into the muscular-skeletal system of an animal, said part comprising a body, and structure on said body for attaching said part to the muscular-skeletal system of an associated animal, said body and said attaching structure being formed of a ceramic essentially comprising by weight the equivalent of from about 51% to about 66% aluminum oxide and from about 11% to about 26% silicon oxide and from about 18% to about 28% of oxides of metals selected from the group consisting of alkali metals and alkaline earth metals, said ceramic being inert to attack by animal fluids and being of a character such that the body tissues of the associated animal will grow thereupon and in contact therewith.

4. A prosthetic part for incorporation into the muscular-skeletal system of an animal, said part comprising a body, and structure on said body for attaching said part to the muscular-skeletal system of an associated animal, said body and said attaching structure being formed of a