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Opinion

Biomedical Materials

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In today's world, there is an increasing demand towards component materials that are durable, reliable, light weight, and with mechanical properties that are significantly better than those of the traditional materials. At the same time it is preferable if these materials are eco-friendly and bio-degradable. Biocomposite material has shown signs of satisfying most of the above conditions. Finally, the advantages of using biocomposite material, its eco-friendly nature and its future in the industry have been indicated with clarity. Biomaterials improve the quality of life for an ever increasing number of people each year. The range of applications is vast and includes such things as joint and limb replacements, artificial arteries and skin, contact lenses, and dentures. This increasing demand arises from an aging population with higher quality of life expectations. The biomaterials community is producing new and improved implant materials and techniques to meet this demand, but also to aid the treatment of younger patients where the necessary properties are even more demanding. A counter force to this technological push is the increasing level of regulation and the threat of litigation. To meet these conflicting needs it is necessary to have reliable methods of characterization of the material and material/host tissue interactions. The main property required for a biomaterial is that it does not illicit an adverse reaction when placed into service. The various materials used in biomedical applications may be grouped into (a) metals (b) ceramics (c) polymers and (d) composites made from the above groupings. Metals and alloys that is successful as biomaterials include: gold, tantalum, stainless steel, NiTi (Shape memory alloy), Co-Cr, and Ti alloys. Machining of such Orthopaedic alloy implants, with high speed machining, will offers advantages, but also have their own disadvantages that include complexity, high machining cost. Titanium was used for bone replacements, during past decades, but those implants are simple geometric approximations of the bone shape. Mismatches can occur between real bone and implants often causing stress concentrations and premature implant failure. The machining stocks are uneven & more than the required levels. This leads to more weight at rough casting stage and contribution of more machining time and these castings are manufactured in green sand moulding process which leads to poor surface finish, more material in machining surfaces and less dimensional stability. The above said complexities give way for the next generation bone implants that are polymers and ceramics which have better biocompatibility and good tensile properties.