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Editorial

Surface engineering and performance of biomaterials

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This special issue highlights original research papers or review articles that discuss the current state-of-the-art surface engineering of biomaterials, particularly implants and biomedical devices. Hydroxyapatite is a commonly used material for biomedical implants due to its resemblance with bone materials. Plates, screws, pins, and artificial joints are only some bone fixation devices that often use 316L stainless steel. The behaviour of hydroxyapatite powder on SS316L has been mentioned to understand the adhesion of hydroxyapatite powder with SS316L, its bioactivity behaviour and mechanical properties. The plasma spray technique is used to deposit the hydroxyapatite-based coatings on the biomedical implants [1]. There is some issue involved with the deposition of this material, which leads to the deterioration of desired phases. The consequences related to the plasma spraying deposition have been discussed in detail and the various methods such as doping of other phases in hydroxypatite-based coatings have been analysed [2]. The recent advancements in biomaterials lead to product development using cold spray additive manufacturing, which has been discussed in the paper with future prospects [3]. Tricalcium phosphate (TCP) has many advantages in biomedical applications, especially in teeth and bones, and therefore many researchers focused on enhancing the properties of this material by different methods [4]. The relationship modelling for surface finish for laser-based additive manufacturing has been described in detail with experimental analysis [5]. In another study related to biomedical applications, biological tests were performed to check the performance of the developed composites, which showed significant improvement in the biological aspect [6]. The importance of aluminum matrix composites has also been studied for their performance. The wear rate was evaluated by adding reinforcement and the effect of the addition of reinforcement was studied [7]. In another study, the yttrium stabilized zirconia-based coatings were deposited by plasma spray method. The coatings were reinforced with different oxides to increase the melting point of the coatings and thereby reduce the porosity[8]. The applications of biopolymer coatings in biomedical engineering were presented in review articles, wherein the various types of biopolymer coatings material and methods were discussed [9]. The use of expert systems in biomedical science has also been included in this special issue. The dental implants and industry was considered in the paper in detail and it can help the readers to indulge themselves into this advanced field of biomaterials [10].

A machining is an important step of manufacturing and the biomedical implants are very sensitive materials due to its brittleness and the effect of machining of bio-implants have been discussed in the study [11].

The recent advancement in the processing and fabrication of material is microwave route. The same has been adopted for the fabrication of materials on bio-medical steels. The paper describes the fundamental principle of microwave processing, and its development of bio-medical implant claddings using this technique [12]. The corrosion cracking is an important area in bio-medical implants. Mg alloys based bio implants are commonly used as biomaterials and their performance analysis has been presented in a review and various failure analysis approaches have been discussed [13].

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