



Metal Powder Technology in Prosthetic Dentistry

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Metal powder technology is on the upgrade over time and related products are becoming to facilitate multiple scientific areas' routine procedures. Dentistry is one these important areas that follows up this technology. When a tooth needs to be restored which cannot be treated with fillings, dentist usually obliged to select crowns for the replacement of lost tissue? In cases of missing teeth, dentist prepares the teeth adjacent to edentulous area, thus, the treatment option becomes bridge prosthesis. Nowadays instead of making preparations on the adjacent teeth, dental implants are placed in the missing areas. Dental implants only replace a root part of a missing tooth, so dentist should still prepare crowns to restore them for the suitability of the edentulous area. Most preferred crown and bridge materials are metal-ceramic restorations. Although there are all-ceramic restoration types, they have still some limitations to be used in heavy load bearing areas in the mouth. Metal ceramic restorations have metallic substructures and porcelain is fired over that framework. Preparing these metallic substructures is very important in terms of correct fitting of these restorations [1]. If they are not fitted well, it is not surprising to experience microleakage which causes secondary caries, or soft tissue infections around the supported teeth. Some noble or base metal alloys are preferred in such kind of restorations. They and their fabrication process are usually too expensive. Metal substructures have been generally fabricated by the lost wax technique and casting method. There may be still some problems during these complex procedures. Taking impressions from the area to be restored is also not easy in most cases; patients may feel discomfort and inaccurate marginal fit could be occurred depending on the sensitivity of technique and quality of impression materials. To eliminate these personal and material dependent factors, Computer-aided design/computer-aided manufacturing (CAD/CAM) systems are getting popular to construct the dental prosthesis [2].

Direct metal laser-sintering system is an additive metal fabrication

technology, based on information received from three dimensional CAD in which metal powder is shot selectively using a data file and fused with a laser to laminate approximately a 20–60 μm thick layer [3]. This method facilitates the fabrication of restorations by eliminating steps; decreasing working time and forming complicated shapes. During the casting method, metal waste is big concern in the dental laboratories. But metal laser-sintering system reduces metal waste by selectively shooting the required amount of the restoration.

This additive manufacturing which is also called three-dimensional printing or rapid prototyping may be also suitable for much more biomedical applications when complex shapes are also needed to be fabricated like custom-designed functional implants or prostheses made from biocompatible metals. Custom-made, root-analogue direct laser metal forming implant was recently published as a case report.

Although these systems are new and the equipments are expensive, most of the dentists are wondering the clinical outputs of this technology and getting excited to use them in their routine dental treatments especially in most difficult cases.

References

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