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Micro-Scratch based Tribological Characterization of Hydroxyapatite (HAp) Fabricated through Fish Scales

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Abstract

Osteoporosis is a bone disease in which bone and mass density decreases gradually, which leads to the increased risk of bone fracture. The reason might be due to deficiency in vitamin D or calcium intake per day as per recommended by world health organization. Hydroxyapatite (HAp) is known as a bone repairing material because of its properties like osteoconductivity, osteogenesis, osteointegration and biocompatibility. In this paper, HAp is made from fish scales and their micro tribological properties are studied using micro scratch tester (Ducom TR-101). The fish scales are passed through various levels of cleaning, deproteinization, and calcination to produce HAp. Later this HAp is ball milled to make micro sized HAp powder. The prepared HAp powder is compacted using dies and mould to give the shape in disc form. The compacted HAp disc is sintered to a temperature of 1350°C. Surface morphology were shown by field emission scanning electron microscope, which reveals that the surface structure is uniform and dense without visible defects (pores and micro cracks). The mechanical characteristics of the prepared HAp disc were measured by Vickers micro hardness machine. The strength of bonding between the grains of HAp particles were measured by Micro scratch testing machine. X-Ray diffractometer was used to know the various elemental phase composition presents in the prepared HAp. The density was calculated through Archimedes' Principle.

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