Res. Rev. J Mat. Sci. 2018, Volume 6
DOI: 10.4172/2321-6212-C1-015



## Development and characterization of Hydroxyapatite-Alumina- Zrirconia biocomposites for orthopedic implants

**Said Laasri[1], Mohamed Es-Saddik[2], Mohamed Taha[3], Abdelwahed Hajjaji[4], Abdelaziz Laghzizil[5]** and **E. K. Hlil[6]**
[1,4]Chouaib-Doukkali University, Morocco
[2,3]Ibn Zohr University, Morocco
[5]Mohammed V University, Rabat Morocco
[6]CNRS, Université Grenoble Alpes, France

The development of new biomaterials with enhanced mechanical and physical properties and biocompatibility has become a major challenge in biomaterials community. In this case, biomaterials play a very important role as source for needed materials to satisfy human requirements. Among different categories of biomaterials, hydroxyapatite HAP is responsible for bio-mineralization, osteoinduction, and osteo-integration and has good biocompatibility and bioactivity. Because pure HAP shows poor mechanical properties, low strength (<120MPa) and low fracture toughness, different inorganic additives such as zirconia and alumina are introduced in order to improve the properties of hydroxyapatite. In this study, various HAP-$ZrO_2$ and HAP-$Al_2O_3$ biocomposite powders have been synthesized using a modified precipitation method under ultrasonic irradiation and haracterized by numerous techniques. The in situ growth of $ZrO_2$ and $Al_2O_3$ followed by thermal treatment allowed for the formation of nanocomposites homogeneously dispersed in the hydroxyapatite phase. The benefit of this association favors the dispersion of oxide phase in the apatite structure and therefore enhances their intrinsic mechanical properties. High oxide loadings within the HAp structure can even lead to superior mechanical efficient compared to the HAP alone. Considering these results, we have prepared here HAP-$ZrO_2$ and HAP-$Al_2O_3$ nanocomposites and evaluated their mechanical properties towards the addition of oxide phase.

laasrisaid@yahoo.fr