

## Synthesis, structural insights and mechanical evaluation of selective rare-earth substitutions in zirconia toughened alumina system for hard tissue replacements

The thesis work aimed to use rare earths as potential substitutions in ZTA system. Rare earth substitutions in ZTA system is attempted to impart dual features explicitly as a stabilizer and also to divulge additional features like fluorescence and MRI based imaging. Generally, imaging of prosthesis is done through the injection of a contrast agent to the patient in order to obtain better resolution image; however, side effects to the patient has been a major shortcoming that ranges from hypersensitivity to mortality. Renal failure is the most common problem associated with the use of contrast agents. In this context, the inherent contrast features in ZTA facilitated by the inclusion of rare earths is expected to show a greater propensity for an easy monitoring of the implant performance through high resolution images and also avoid the ill side effects that are more palpable with the contrast agents. Thus, the outcome of thesis work is expected to provide a great impact in orthopedic surgeries as well as in imaging contrast tools.