

**12-058 In situ synchrotron X-ray powder diffraction study of the early age hydration of  $\alpha$ -tricalcium phosphate/tricalcium silicate composite bone cement**

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Biocompatibility, osteoconductivity and mechanical properties of  $\alpha$ -tricalcium phosphate ( $\alpha$ -TCP) based phosphate cements can be improved by adding tricalcium silicate (C3S); however; the addition of C3S delay the dissolution of  $\alpha$ -TCP particles at early stages. Thus, the in situ setting reaction of  $\alpha$ -tricalcium phosphate/tricalcium silicate composite bone cement ( $\alpha$ -TCP/C3S) was study by high energy X-ray generated by a synchrotron source at the Brazilian Synchrotron Light Laboratory (LNLS), within the first 72h. The results showed that the precipitation of hydroxyapatite (HA) takes place apparently after 72h of hydration for conventional cements and the addition of C3S induce the precipitation of HA at early times depending to the added content. Nevertheless, these results are quite different from those obtained by conventional XRD method, suggesting that the mechanism of hydration is diffusion dependent in large extension and the bulk and surface characteristics of the materials are quite different.