

## E0030

**X-ray Rietveld Analysis of Mg<sup>2+</sup>-doped  $\beta$ -Tricalcium Phosphate.** R. Enderle, F. Götz-Neunhoeffler, J. Neubauer, M. Göbbels, Dept. of Mineralogy, Univ. of Erlangen-Nuernberg, Schlossgarten 5a, 91054 Erlangen, Germany.

$\beta$ -Tricalcium Phosphate ( $\beta$ -TCP) ceramics are known to be an attractive material for bone substitution because of their excellent biodegradability and bioactivity. TCP undergoes a reconstructive phase transformation from  $\beta$ -TCP (SG: R3c) to  $\alpha$ -TCP (SG: P2<sub>1</sub>/a) at 1150 °C causing micro cracks during sintering process. Substitution of Ca<sup>2+</sup> by Mg<sup>2+</sup> in TCP is known to delay phase transformation temperature leading to denser ceramics with better mechanical properties. In this investigation the maximum chemical substitution by Mg<sup>2+</sup> on Ca<sup>2+</sup>-sites in the TCP structure for synthesis at 1025 °C  $\pm$  10 °C (in air) was examined. X-ray powder diffraction analysis (XRPD) in combination with Rietveld method (TOPAS 2.1) was employed for quantitative phase analysis and structural refinement of the synthesized samples. A maximum substitution by 14 mole % of Mg<sup>2+</sup> on Ca<sup>2+</sup>-sites in the  $\beta$ -TCP structure was determined for powders calcinated at 1025 °C  $\pm$  10 °C. Ca<sup>2+</sup> is up to 10 mole % Mg<sup>2+</sup> preferably replaced on the six fold coordinated Ca<sup>VI</sup>(5) site. Replacement of Ca<sup>2+</sup> on the nine fold coordinated Ca<sup>IX</sup>(4) site by Mg<sup>2+</sup> does not significantly take place until the Ca<sup>VI</sup>(5)-site is completely occupied by Mg<sup>2+</sup>.