



**Theoretical and Physical Chemistry Institute  
National Hellenic Research Foundation**

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**LECTURE**

**“Probing calcium phosphates using *in situ* and *ex situ* Raman spectroscopy”**

**Dr. Konstantinos Chatzipanagis**

**Helmholtz Centre Potsdam,  
GFZ German Research Centre for Geosciences,  
Potsdam, Germany**

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**Seminar room, ground floor, NHRF**

# **Probing calcium phosphates using *in situ* and *ex situ* Raman spectroscopy**

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Calcium phosphate (CaP) based materials such as hydroxyapatite and carbonate-substituted apatite are the most significant components of bone and teeth providing them with extraordinary mechanical properties. Hence, calcium phosphate materials have been largely considered for reconstruction of structural defects in dental and orthopedic applications. Such applications include dental implants used in periodontal treatment and implants for bone replacement. Consequently, expanding our understanding regarding the formation pathways of these phosphate materials as well as the impact of ion substitutions accommodated inside their structure is of paramount importance for the design and fabrication of suitable biomimetic materials.

In Raman spectroscopy, monochromatic light interacts with matter and the inelastic scattering resulting in energy shift from the exciting radiation provides molecular/structural information of the material under investigation. Within this context, Raman spectroscopy was used as a versatile tool to follow the formation of crystalline apatite from an amorphous precursor in various liquid environments and also to study the effect of systematic titanium ion doping in the apatite structure as well as the simultaneous development of a secondary titanium oxide phase.