# CICLO DE SEMINARIOS 2012

SMAT-C Soft Matter Research and Technology Center

## "Molecular organisation in biopolymer matrices: Opening it up at the nano-level"


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I am a post-doctoral research assistant in the Bristol Positron Group working with Professor Ashraf Alam. My main research interest lies in the characterisation of the molecular organisation and dynamics of glass-forming systems in order to gain a more complete understanding of their physical, chemical and mechanical properties. Both, the structure and dynamics of glass-formers are closely related to the local free volume which exists between the molecules in such systems due to irregular packing, density fluctuations and topological constraints. This local free volume can be probed directly by using a unique and versatile technique, commonly known as Positron Annihilation Lifetime Spectroscopy (PALS). PALS is an invaluable tool for studying the nano-structure and dynamics of a glass-forming systems, ranging from molecular liquids to organic, synthetic and bio- polymers. .

In my talk I shall focus on our recent studies on a number of biopolymer glass-formers (e.g.: gelatin and maltodextrins) which are of major importance for the pharmaceutical and food industries, where they are commonly used for the encapsulation of labile bio-active ingredients. PALS is used in conjunction with a number of complementary techniques to probe the changes in physical state, molecular packing and dynamics of these materials as a function of temperature, matrix composition and the level of hydration. By gaining an understanding of the mechanisms which govern the relationship between matrix composition, molecular mobility and the nature of the local free volume, it is possible to eventually rationally control the macroscopic properties of these biopolymer materials, in order to design optimal encapsulating matrices.

**Martes 3 ABRIL 2012, 13:00 horas**

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