

Ortho-Positronium annihilation in room temperature ionic liquidsT. Hirade^{1,2*}¹*Nuclear Science and Engineering Center, Japan Atomic Energy Agency,
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The longest annihilation lifetime component is caused by the pick-off annihilation process of triplet Positronium (Ps) i.e. ortho-Positronium(o-Ps) in insulating materials. Ps creates a bubble in liquids because of negative work function of Ps and localizes in it. The size of the bubble is controlled by the balance between zero point energy of Ps and energies of volume and surface of the bubble. Therefore, there is a good correlation between o-Ps pick-off annihilation rates and surface tension for many liquids [1]. Furthermore Tao-Eldrup model gives relation between bubble sizes and o-Ps pick-off annihilation rates in many liquids [2].

The positron annihilation lifetime measurements in RTILs showed very strange results [3]. Finally, positron annihilation age-momentum correlation (AMOC) measurements indicated that it was caused by slow bubble formation in RTILs [4]. Then I discovered the oscillation of o-Ps annihilation rates in room temperature ionic liquids (RTILs) which indicated, probably, the oscillation of the Ps bubble [5, 6]. Stepanov et al. [7] calculated change of the bubble size in many liquids and the oscillation of the bubble was not expected except for a liquid He. It means that the structure of RTILs in nanometer scale is very different from usual liquids. Moreover, o-Ps pick-off annihilation rates seem to be too small for the macroscopic surface tension of RTILs.

I am going to discuss what you can study by the positron annihilation methods for the structure of RTILs in nanometer scale.

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