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Pick-off annihilation of delocalized positronium in BaF2 at elevated temperatures

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Abstract content
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. Positron lifetime components and associated intensities in the temperature range 300 – 800 K were measured using standard fast-fast coincidence technique. Two lifetime components were resolved after background and source corrections. The long lifetime component decreases in the temperature range from 500 ps at 300 K to 402 ps at 711 K. This corresponds to a fractional increase in the annihilation rate of 22% in the temperature range 300 K to 693 K. The de-trapping of positronium from the Bloch states followed by annihilation through the 'pick-off' process appears to be one of the dominant processes in the long positron lifetime components in the temperature range. Annihilation rates from positron annihilations with valence and core electrons of the individual atoms of the sample are also calculated using density functional theory in the framework of generalized gradient approximation.

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