

Abstract Submitted
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Positron Annihilation 3-D Momentum Spectrometry by Synchronous 2D-ACAR and DBAR¹ LARRY W. BURGGRAF, ANGELO M. BONAVIDA, Air Force Institute of Technology, CHRISTOPHER S. WILLIAMS, Sandia National Laboratory, STEFAN B. FAGAN-KELLY, STEPHEN M. JIMENEZ, Air Force Institute of Technology — A positron annihilation spectroscopy system capable of determining 3D electron-positron (e^-e^+) momentum densities has been constructed and tested. In this technique two opposed HPGe strip detectors measure angular coincidence of annihilation radiation (ACAR) and Doppler broadening of annihilation radiation (DBAR) in coincidence to produce 3D momentum datasets in which the parallel momentum component obtained from the DBAR measurement can be selected for annihilation events that possess a particular perpendicular momentum component observed in the 2D ACAR spectrum. A true 3D momentum distribution can also be produced. Measurement of 3-D momentum spectra in oxide materials has been demonstrated including O-atom defects in 6H SiC and silver atom substitution in lithium tetraborate crystals. Integration of the 3-D momentum spectrometer with a slow positron beam for future surface resonant annihilation spectrometry measurements will be described.

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Larry Burggraf
Air Force Institute of Technology

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