Positron annihilation spectroscopy is a powerful tool to measure atomic scale vacancies with remarkable sensitivity and has been very useful in a broad range of fields. The use of high energy accelerators to produce gamma rays generating positrons inside the sample directly without the need for generating positrons add additional unique capabilities for defect studies in bulk materials. It provides a highly sensitive probe for defect and stress measurements in thick materials. Moreover, it eliminates source contribution and background from the positron lifetime spectrum which may complicate data analysis and often limit the sensitivity of the technique. Here I will present examples of Accelerator based PALS measurements in semiconductors, photonic materials, transparent ceramics, irradiated materials and even in stress measurements in engineering materials. I will discuss how these PALS measurements reveal the origin of interesting physics phenomena in these materials and emphasize the advantages of the technique.