

P4 | **Positron annihilation lifetime spectroscopy of ABS objects manufactured by fused deposition modelling**

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The mechanical properties of acrylonitrile butadiene styrene (ABS) objects manufactured using fused deposition modelling is subject of many studies due to the growth in popularity of this method of production. The most noticeable property of the material is its anisotropy of the mechanical behaviour caused mainly by introduction of voids throughout production process but also by different properties of filament build surfaces and weld interfaces. The recent studies suggest that the difference may result from various molecular structures of the build and the interface which occurs for different build orientation [1].

In the research ABS specimens were subjected to positron annihilation lifetime spectroscopy (PALS) to explore possibilities of identifying differences in molecular structure inside the material. The set of specimens was prepared including square tiles and long rectangular tiles with all filament beads parallel to longer edge. Both types of tiles were produced with various filament overlapping parameter with overlapping both in horizontal and vertical direction. The results show that despite different overlapping parameters changes of the PALS parameters are small especially within the same specimen shape.

[1] D. P. Cole, J. C. Riddick, H. M. Iftekhar Jaim, K. E. Strawhecker, N. E. Zander, Appl. Polym. Sci. 133 (2016) DOI: 10.1002/APP.43671