Influence of magnetization on thermal and debonding properties of TEPs

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Nowadays, adhesive bonding applications are growing in many industries, like automotive, aeronautics or electronics. However, its recyclability is not easy since it is an irreversible process and adhesive joints cannot be dissembled without damage the substrates. In the last years, the development of new debonding technologies and processes are becoming of great interest, being the most common the addition of fillers that allow the debonding. Focusing in the last technology, thermally expandable particles (TEPs) are formed by a thermoplastic shell filled with liquid hydrocarbon. When they are subjected to heat, the shell is softened and the gasification of the hydrocarbon occurs. Therefore, they expand producing the debonding of the joint [1]. On the other hand, the addition of these nanofillers change the adhesive properties and it is interesting to create a tailored particle distribution by magnetizing the particles and moving it applying a magnetic field [2].

In this work, Expancel 031 DU 40 particles were used. Their diameter ranges from 10 to 16 µm. As adhesive, an epoxy adhesive Araldite® LY 1564 SP with Aradur® 5003-1 BD hardener was used. TEPs was magnetized with the method previously developed [3] and the effect of the addition of non-magnetized and magnetized TEPs on thermal properties of the epoxy adhesive has been studied. Besides, the effect of the magnetization process on the debonding properties of TEPs has been determined.

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