**Title:**

**Synthesis of low density polyester particles as light-fillers for wood-based panels and thermoplastics**

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**Abstract:** (Your abstract must use **Normal style** and must fit in this box. Your abstract should be no longer than 300 words. The box will 'expand' over 2 pages as you add text/diagrams into it.)

Nowadays, the reduction of weight is an important issue in several areas such as the furniture and automotive industries. Lightweight wood-based panels, with appropriate mechanical performance, are desired to facilitate handling and transportation. Concerning the automotive industry, lighter parts allow higher vehicle efficiency and thus lower $CO_2$ emissions.

In this context, we are studying the use of low density particles (LDPs) as light fillers in wood-based particleboards and thermoplastics. These particles combine low density and high mechanical resistance as a result of an internal multi-alveolar structure separated by rigid polymeric walls. The structural material is unsaturated polyester crosslinked with styrene.

For producing LDPs, an organic phase comprising unsaturated polyester dissolved in styrene is dispersed in an aqueous solution of polyvinyl alcohol (PVA) at high stirring rate. A base is previously added to the organic phase, causing the neutralization of the polyester carboxyl groups and forming polyester salts which leads to the diffusion from the external aqueous medium. This entrapped water forms the internal vesicles, and the whole system becomes a water-in-oil-in-water (W/O/W) emulsion (double emulsion). Radical polymerization is then initiated by adding an organic-soluble initiator. Particles are then washed with distilled water, sieved and dried.

For each application (wood panels and thermoplastics, respectively) LDPs must have significantly different sizes, hence the great challenge of process optimization. The influence of stirring rate conditions, type of cure initiator and drying conditions on the final internal vesiculation, particle size and density were studied. Well vesiculated LDPs, with two diameter ranges, 1-4 mm and 3-45 μm, were prepared. Their performance in lignocellulosic particleboards and in polypropylene matrix was studied.