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EVOLUTION OF THE THERMO-MECHANICAL PROPERTIES OF PCB FR4 COMPOSITES DURING LONG AGING

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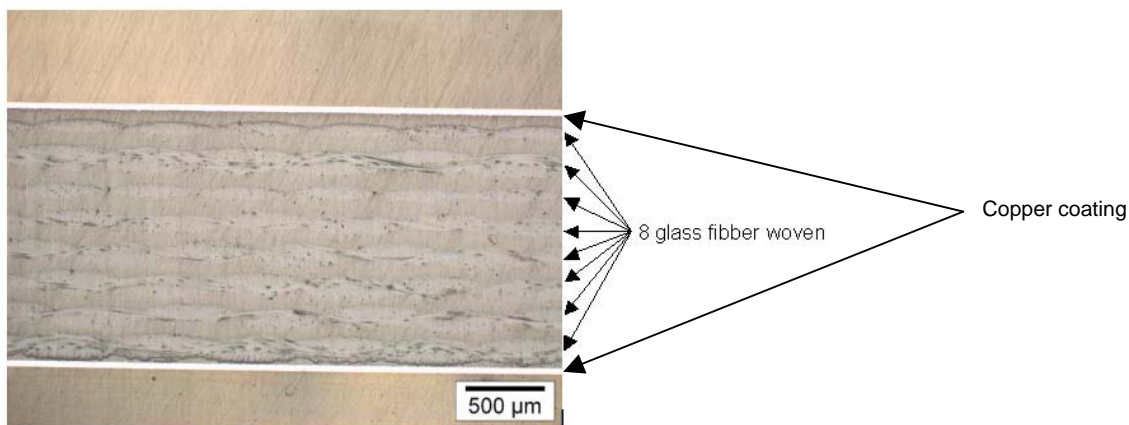
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In Mechatronic, the complete behaviour laws of Printed Circuit Board Flame Retardant 4 (PCB FR4) are required for automotive part designing. The PCB FR4 is a composite material with an epoxy matrix and 8-glass fiber woven. The woven are composed of a weaving of glass fibers in the direction 0°/90°. The PCB FR4 is coated with copper on each side. These coatings are removed before testing.



In the current studies, the PCB FR4 are well known in electronic fields¹ but in mechatronics, the requirements are more stringent. Several tests have been done in the military² and aeronautic fields³ such as tensile tests at cryogenic temperatures. However, these tests did not take into account the long aging of the material. In this study, PCB FR4 were aged at 110°C and 50°C from 0 h to 5000 h. Tensile tests, Dynamical Mechanical Analysis tests, Infrared analyses and Differential Scanning Calorimetry analyses were performed with these aged material.

Whatever the aging temperature and duration, the tensile properties at room temperature do not change but the DMA results show the gradual lost of mechanical properties for aged samples. DSC analyses underline the fall of the glass transition T_g with the aging and Infrared analyses permit us to discuss the chemical mechanisms interfering during of the PCB FR4 aging.

References

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