

**Enhanced flame retardant properties of wood-based composite board by addition of graphene nanoplatelet**

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In construction industry, flame retardant properties of materials have been important and there are many researches to improve flame retardant properties by adding carbon materials in the wood-based board in recent. In this study, graphene nanoplatelet (GnP)/phenolic foam (PF)/wood composite boards were fabricated with different GnP content as 5, 10 and 20 w/w% to investigate the effect of GnP on the retardant properties of wood-based composite board. To evaluate thermal properties, the thermogravimetric results conducted under Air and N<sub>2</sub> atmospheres. The thermal stability of composite board improved and the initial decomposition temperature delayed with increase in GnP content. Also, the char yield increased up to 9.7% when GnP is added with 20w/w, whereas char yield of raw wood board and PF added board is 0 and 1.9%, respectively. Flame retardant properties were investigated using Limiting oxygen index (LOI) test. The LOI value of the raw wood board is 23.8, but that of the GnP added composite board increased up to 31.7%. Therefore, GnP in the wood-based board can form char at the fire and it led to delay the combustion of composite board.

**Key words:** Graphene nanoplatelet; wood-based board; Flame retardant; Limiting oxygen index (LOI)