

# PROCEEDINGS

## Influence of Resin Matrix Rigidity on the Ballistic Performance of PBO and Aramid Fiber Reinforced Composites

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### ABSTRACT

The rigidity of the resin matrix is a critical factor affecting the impact resistance of composites [1]. However, the intrinsic relationship between resin matrix rigidity and ballistic performance remains insufficiently understood. To reveal the influence mechanisms of resin matrix rigidity on ballistic performance, this study compares the ballistic limits of PBO-140, PBO-200, Aramid III, and Aramid II fiber reinforced composites with resin matrices of different rigidities (epoxy resin, PX90, and PX30) through ballistic impact tests. The experimental results show that, the ballistic limit of composites with PX90 resin is higher than that of composites with epoxy resin, except for composites with Aramid III fiber. However, for Aramid III fiber reinforced composites, the interfacial bonding strength of epoxy resin composites is significantly higher than that of PX90 resin composites. This allows the epoxy resin composites to more effectively dissipate impact energy through interlayer delamination, resulting in superior ballistic performance. Furthermore, for Aramid II, and PBO-200 fiber reinforced composites, the ballistic limits of PX30 resin composites are approximately 4.2% and 7.7% higher than those of PX90 resin composites, respectively. Flexible matrix can significantly enhance the impact resistance of composites; however, this effect is influenced by both the matrix stiffness range and the interfacial bonding strength.

### KEYWORDS

Ballistic limit; fiber reinforced flexible composites; resin matrix rigidity; interfacial bonding strength

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### References

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