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1 **Fracture behavior and strain evolution of laminated composites**

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9

10 **Abstract**

11 Laminated composites consisting of alternating layers of TiB_w/Ti and Ti(Al) were
12 prepared, and exhibited a superior elongation to fracture that is nearly 20 times higher
13 than that of bulk TiB_w/Ti composites. Coupling two- and three-dimensional fracture
14 characterizations of TiB_w/Ti-Ti(Al) laminated composites show distinct fracture
15 characteristics including crack distribution, formation of tunnel cracks, and
16 suppression of crack propagation. These experimentally observed fracture
17 characteristics are intimately correlated with in situ monitored strain evolution process,
18 by which we observed that strain localization is effectively suppressed by laminated
19 structure, thus lowering the stress intensity near the crack tip as well as the driving
20 force for crack propagation. As a consequence, laminated composites are not so
21 sensitive to the early cracking, and exhibit a good strength-ductility combination.

22

23 **Keywords:** Laminated structures; Image analysis; Fracture; Strain delocalization;

24 Digital image correlation (DIC).

25

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