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# Research on adhesive properties of polydimethylsiloxane-carbon fiber composite material

Dongjing He<sup>1,2</sup>, Gang Cheng<sup>3</sup>, Ling Tang<sup>4</sup>, Lie Chen<sup>5</sup>, Shiyao Li<sup>1,2</sup>, Ping Gu<sup>\*1,2</sup>, Yang Zhao<sup>\*1,5</sup>

<sup>1</sup>Key Laboratory of Mechanical Behavior and Design of Materials, Chinese Academy of Sciences, Hefei 230026, People's Republic of China

<sup>2</sup>Department of Modern Mechanics, University of Science and Technology of China, Hefei 230026, People's Republic of China

<sup>3</sup>Beijing Key Laboratory of Intelligent Space Robot System Technology and Applications, Institute of Spacecraft System Engineering, CAST, Beijing 100094, People's Republic of China

<sup>4</sup>Automation School, Beijing University of Posts and Telecommunications, Beijing 100876, People's Republic of China

<sup>5</sup>Department of Precision Machinery & Precision Instrumentation, University of Science and Technology of China, Hefei 230026, People's Republic of China

guping@ustc.edu.cn (P. Gu)

yangzhao1@ustc.edu.cn (Y. Zhao)

\*Corresponding authors.

## Abstract:

Polydimethylsiloxane (PDMS)-carbon fiber composite material is a novel adhesive material with enhanced adhesion, demonstrating repeatability and capability to be prepared in large scale. The adhesion properties of this composite depend on the external loading conditions, while the influences of different conditions have not been studied. This paper fabricated large-scale adhesive composite materials and measured the adhesive strength under different loading conditions. Additionally, repeatability of adhesion was tested. The result showed that adhesive strength positively correlated with the preload, the duration of preload and detaching rate, and the preload influenced the adhesive strength most significantly. The maximum adhesive strength occurred at 30 N/cm<sup>2</sup> preload, where normal adhesive strength was ~6 N/cm<sup>2</sup> and shear adhesive strength was ~2.5 N/cm<sup>2</sup>; adhesive strength maintained on ~100% of initial adhesive strength after 100 times of detachments. This article demonstrated that PDMS-carbon fiber composite material had enhanced adhesion and repeatability and provided a reference to the practical application of adhesive composite.

**Keywords:** Adhesion, External effects on adhesion, Gecko-inspired adhesive, PDMS-carbon fiber composites

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