

Abstract Submitted
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Viscoelastic solid glue produced by orb-weaving spiders¹ VASAV SAHNI, TODD BLACKLEDGE, ALI DHINOJWALA, The University of Akron — Modern orb-weaving spiders have evolved well-designed adhesives to capture preys. This adhesive is laid on a pair of soft and highly extensible axial silk fibers as micron-sized glue droplets that are composed of an aqueous coat of salts surrounding the nodules made of glycoproteins. Understanding the adhesion mechanism of these glue droplets has been challenging because both the glue droplets and the axial fibers contribute to the adhesive forces required to detach a thread from a surface. Here, we have decoupled these contributions by developing a novel experimental method to probe individual glue droplets and an energy model to separate the strain energy of the axial silk fibers from the adhesion energy required to peel the glue droplets. We observe that the glue droplets behave as a viscoelastic solid and are strongly affected by humidity and the rate of peeling. Knowledge of the adhesion and the mechanics of the glue will aid in developing bioinspired adhesives in the future.

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