

Supplementary material

Reliability of the Young's modulus of crab exoskeleton materials estimated from nanoindentation tests

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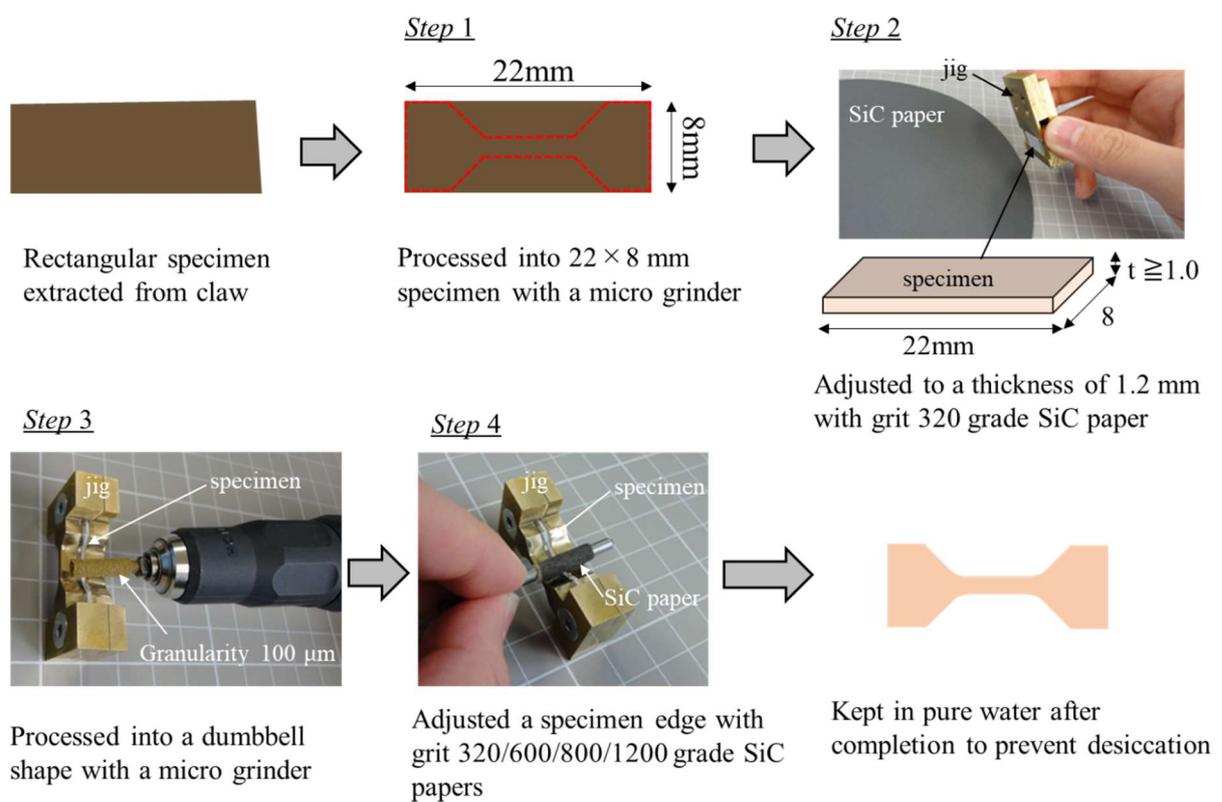


Figure S1. Procedure of the specimen preparation.

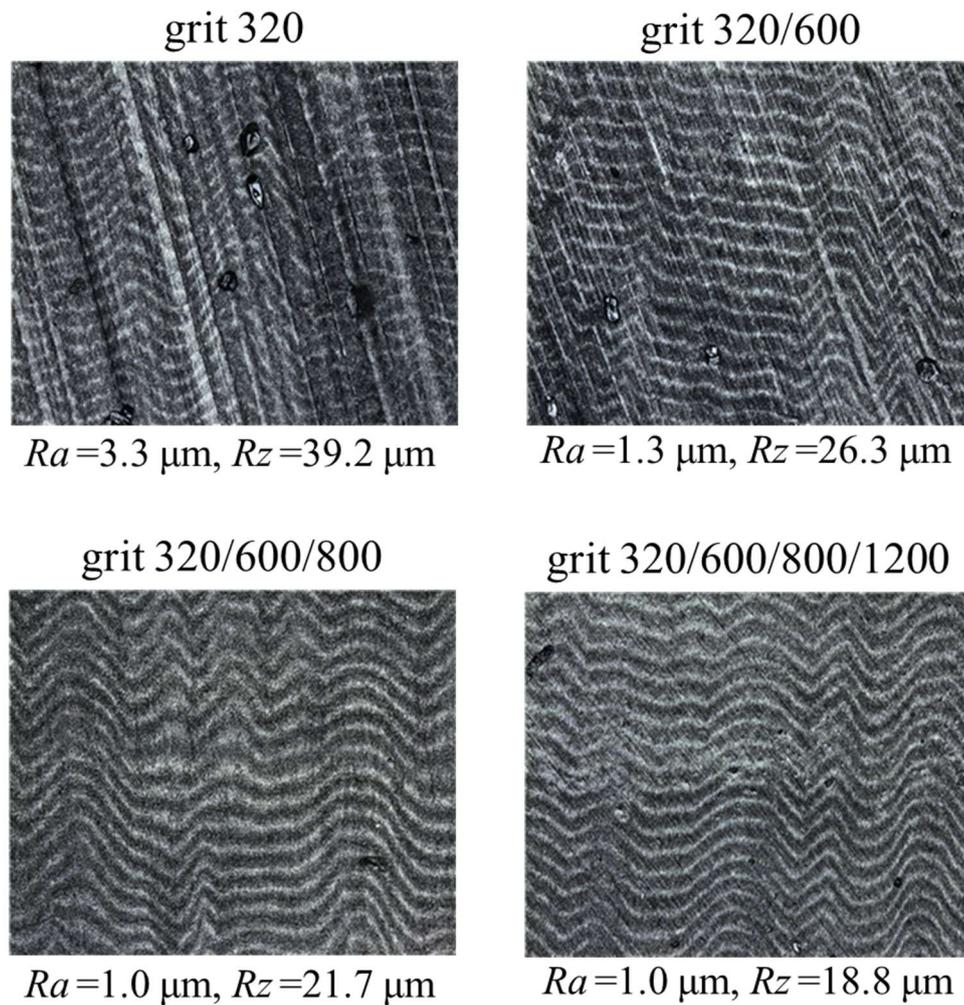


Figure S2. Variations of microstructure ground with grit 320/600/800/1200 grade silicon carbide papers on the exoskeleton and results of surface roughness; Ra : arithmetical mean roughness and Rz : maximum height. Abrasive particle sizes of grinding papers are approximately $35\ \mu\text{m}$ for grit 320, $15\ \mu\text{m}$ for grit 600, $13\ \mu\text{m}$ for grit 800, and $8\ \mu\text{m}$ for grit 1200. Microstructures and roughness were observed and measured through a 3D laser scanning microscope (VK-X200/210, Keyence Corporation, Osaka, Japan).

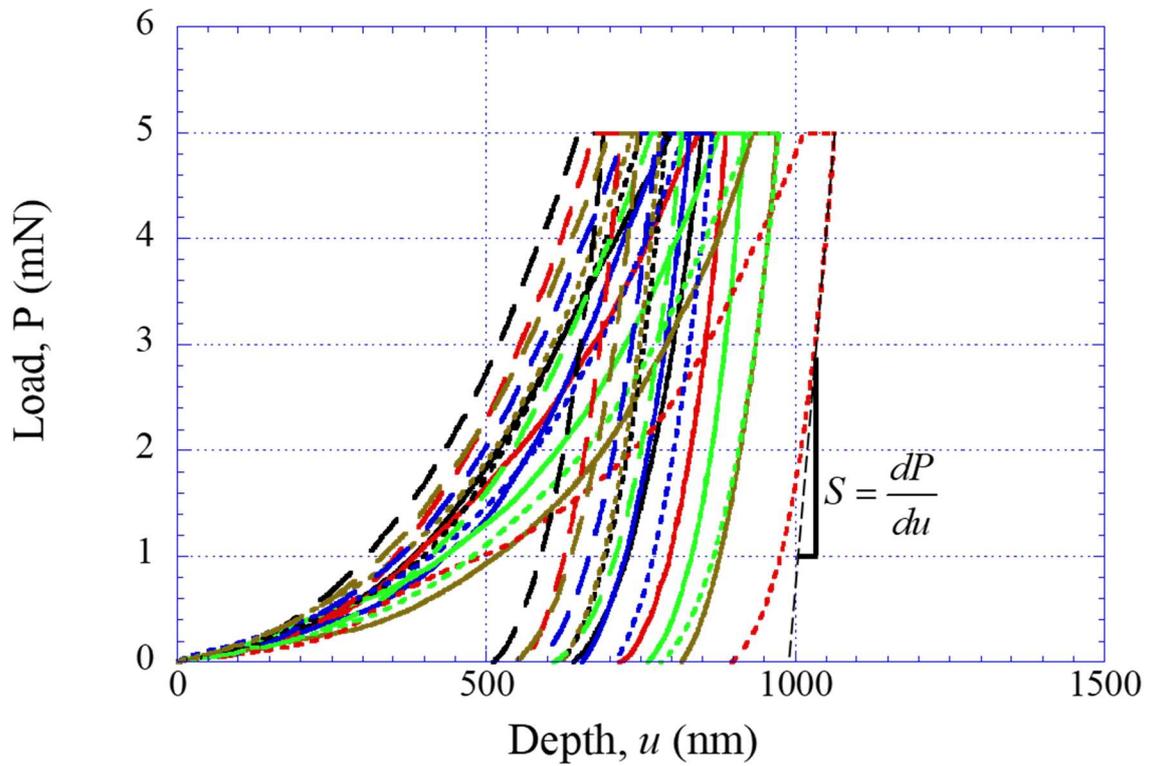


Figure S3. Nanoindentation load–displacement curves for first 15 locations on the cross-sectional plane. Here, S denotes unloading stiffness.

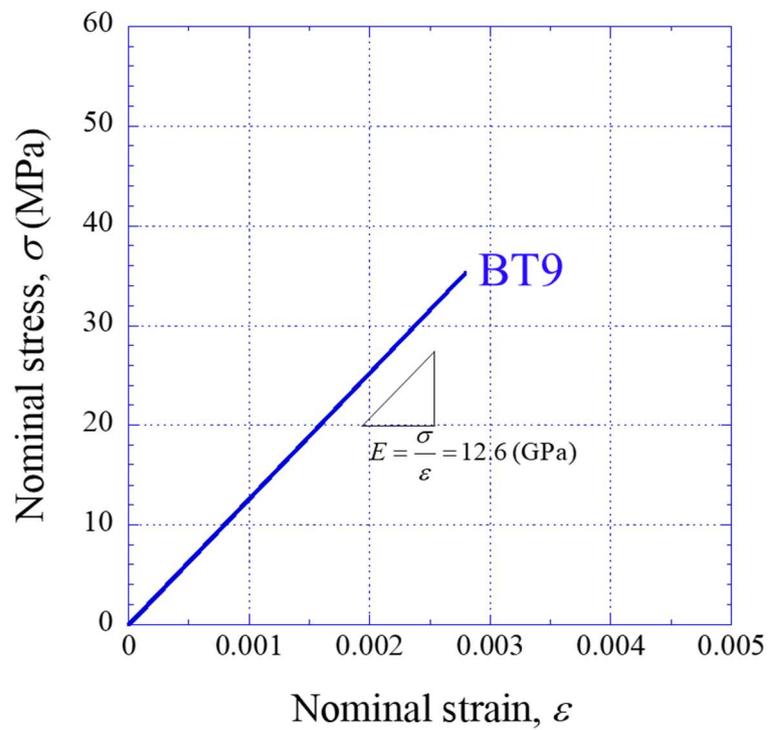


Figure S4. Nominal stress – nominal strain curve of the BT9 dry specimen. The Young's modulus, E , was evaluated from the slope of the linear part of the stress–strain curve.