

Thermal Behavior of A Multi-layer Laminated Fabric Containing PCMs

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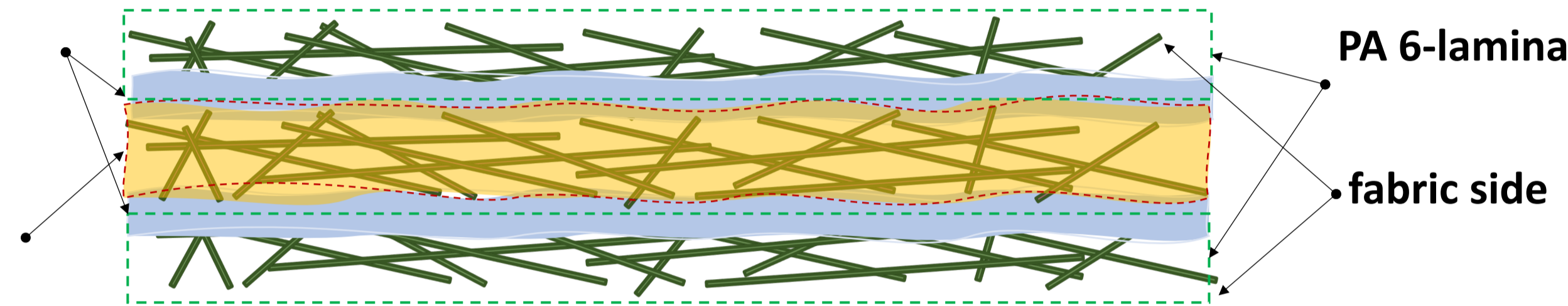
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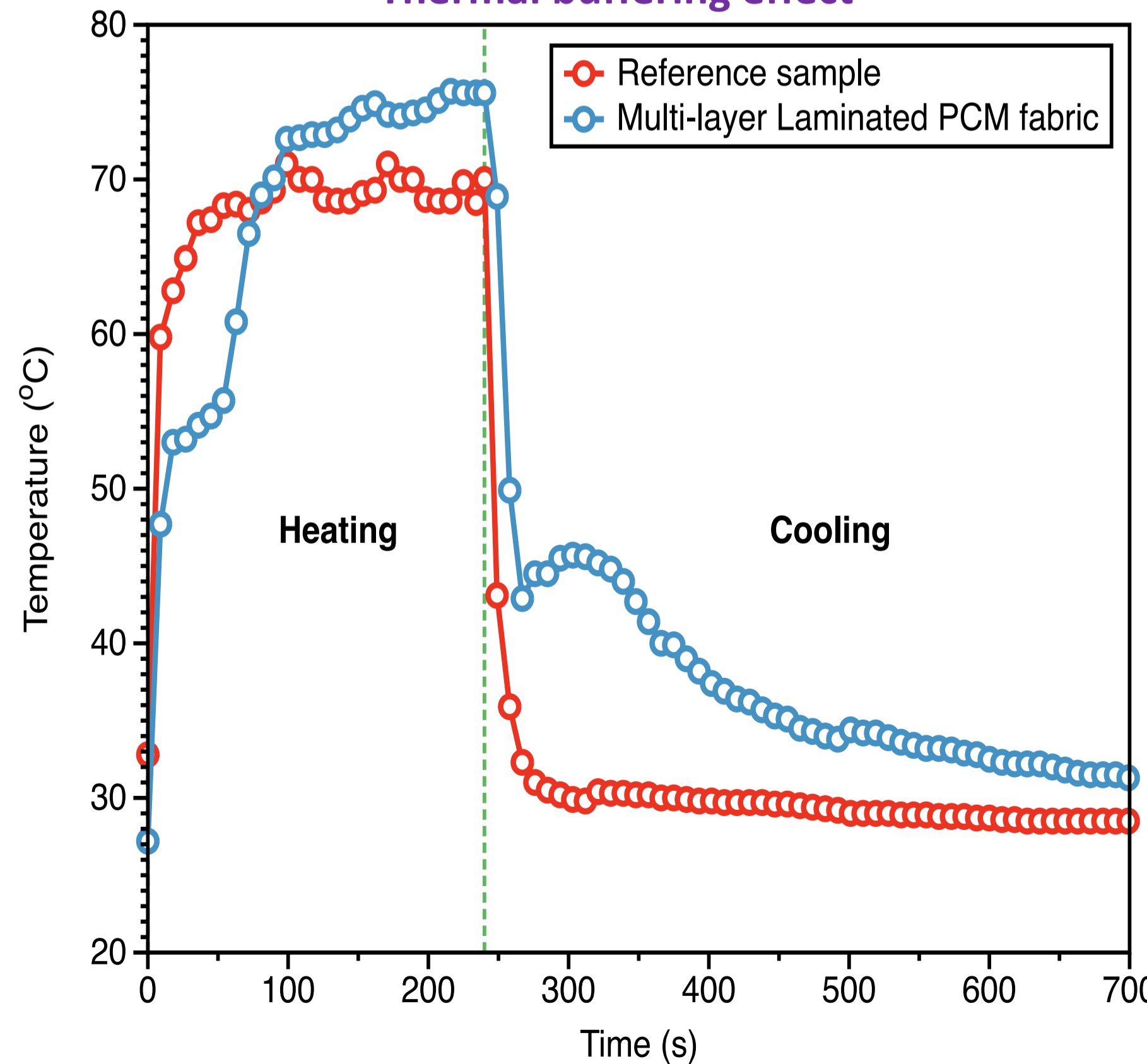
Phase change material (PCM)-incorporated fabrics have been developed for personal temperature regulation. To avoid leakage of melting PCMs from the fabric, various methods have been developed, including microencapsulated PCM (MPCMs), form-stable PCMs (FSPCMs) and solid-solid PCMs (SSPCMs). However, the poor physical property and the limited thermal behavior of such materials are found. To keep the thermal behavior of PCM-incorporated fabrics without leakage as high as possible, a multi-layer PCM fabric consisting of PEG-coated viscose fabric and PA 6-laminated fabric was proposed in this work. The PEG-coated viscose fabric with melting point of 62.37 °C, solidifying point of 44.7 °C, melting enthalpy of 137J/g and solidifying enthalpy of 133 J/g. The leakage and thermal buffering effect of the multi-layer laminated fabric containing PEG were investigated. As a result, the PA 6-laminated fabric successfully resisted against the melting of PEG and no leakage was found. Correspondingly, the thermal buffering effect was found. It took approximate 60s for the multi-layer PA 6-laminated fabric with PEG to reach 60 °C during heating process and approximate 120s to reach 40°C during cooling process. We propose that this work provides a facile method to fabricate PCM fabrics and extends the application of laminated fabrics.

PA 6-laminated side

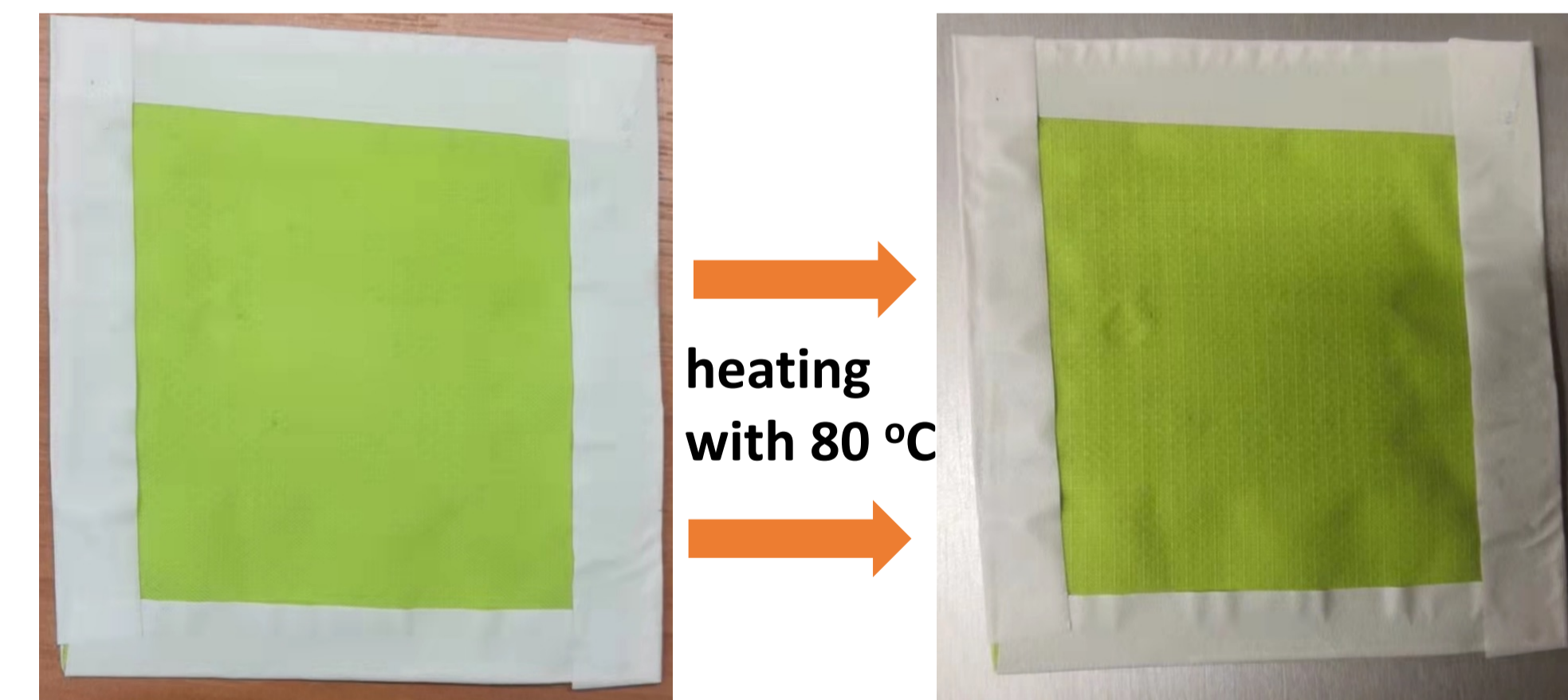
PEG-coated viscose fabric



Thermal buffering effect



No leakage after heating process



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