

Is tanning indispensable for the conversion of rawhide to leather?

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Abstract: Based on the classic tanning theory, the cross-linking is a critical step for the conversion of rawhide to leather, which is believed to be indispensable for enhancing the thermal stability of rawhide. Trivalent chrome (Cr^{3+}) salt has been considered to be the most successfully tanning agent that relies on the coordination with collagen molecules to achieve the cross-linking of rawhide, eventually showing high thermal stability. Unfortunately, tremendous investigations of chrome-free tanning, including non-chrome metal tanning and organic tanning, still fail to provide chrome-free leather with high thermal stability comparable to that of chrome tanned leather, although these chrome-free tanning approaches strictly follow the cross-linking tanning theory that successfully explain the outstanding thermal stability of Cr^{3+} tanned leather. These facts promoted us to consider whether tanning is indispensable for the conversion of rawhide to leather or the cross-linking is really a necessity for accomplishing high thermal stability of leather. In the present investigation, we reported a brand-new controllable drying strategy for the successful fabrication of tanning-free leather, which was completely free from the use of any tanning agent, and the resultant tanning-free leather featured high thermal stability, water-vapor permeability and high mechanical strength. The mechanism of this novel tanning-free leather making strategy was elaborated. Our investigations demonstrated a new conceptual leather making theory that does not relies on the cross-linking of collagen to accomplish leather making, which is promising to realize the manufacture of environmentally benign and eco-friendly leather.

Keywords: tanning-free leather, no cross-linkage, controllable drying, environmentally benign, eco-friendly