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Classification of different animal fibers by near infrared spectroscopy and chemometric models

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Abstract: The qualitative and quantitative detection of animal fibers is becoming more and more essential due to common adulterations in both raw materials and finished textiles. The feasibility of classifying different animal fibers with respect to their categories is investigated via near-infrared (NIR) spectroscopy along with chemometric models. A total of 376 samples including 100 sheep cashmere, 99 cashmere, 95 rabbit fibers and 82 camel fibers were prepared. First, principal component analysis (PCA) was conducted to visualize the possible clustering. Then, two popular chemometric algorithms, i.e., partial least squares-discriminant analysis (PLS-DA) and soft independent modeling of class analogy (SIMCA), were used to develop models on the pre-processed spectra. On the test set, both models achieved 100% sensitivity and 100% specificity. It indicates that NIR spectroscopy combined with an approximate signal treatment and PLS-DA or SIMCA is feasible and successful for classifying different kinds of animal fibers.

Keywords: fiber; textile; near-infrared; chemometrics

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