

Accepted Manuscript

Detecting and classifying minor bruised potato based on hyperspectral imaging

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PII: S0169-7439(17)30625-1

DOI: [10.1016/j.chemolab.2018.04.002](https://doi.org/10.1016/j.chemolab.2018.04.002)

Reference: CHEMOM 3612

To appear in: *Chemometrics and Intelligent Laboratory Systems*

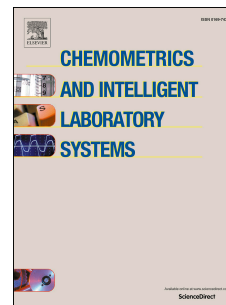
Received Date: 21 September 2017

Revised Date: 26 March 2018

Accepted Date: 1 April 2018

Please cite this article as: D. Ye, L. Sun, W. Tan, W. Che, M. Yang, Detecting and classifying minor bruised potato based on hyperspectral imaging, *Chemometrics and Intelligent Laboratory Systems* (2018), doi: 10.1016/j.chemolab.2018.04.002.

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2 **Hyperspectral Imaging**

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12 **Abstract:** Potato with minor bruise is difficult to be detected in the process of damage identification
13 and is perishable in storage, thus leading to a serious problem of food safety and economic issue. In
14 view of the complexity of bruise detection for potatoes, a nondestructive detection method, based on
15 hyperspectral imaging technique, was proposed in this study. All samples, including healthy potatoes
16 and bruised potatoes belonging to 3 different levels, were taken as experiment objects. First of all, the
17 background in every hyperspectral image was removed by masking aiming at acquiring the average
18 spectra of each potato. Then, Savitzky-Golay smoothing, first derivative, second derivative, standard
19 normal variate and its combinatorial methods were applied to pre-process spectral data, respectively,
20 and the grid search algorithm was applied to optimize modeling parameters. Confirm that the standard
21 normal variate pre-processing technique reinforced the model performance at utmost, and the
22 identification accuracy of bruised samples reached 90.63%. In addition, given the interference of
23 redundant information, the optimized simulated annealing algorithm based on correlation coefficient
24 algorithm was applied to reduce the dimension of the spectral data, which promoted the identification
25 accuracy of bruised samples to 96.88%. Furthermore, the bruise levels of samples were classified using

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