Image Analysis of Surface Roughness

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Why characterise surface roughness?

Smooth surfaces are attractive for many products in both the food and the pharmaceutical industry. By means of image analysis and chemometrics it is possible to measure surface roughness.

Objective

To develop a rapid non-invasive method for predicting surface roughness from images.

Approach

To correlate images taken with the VideometerLab^{®(1)} to visually perceived roughness evaluated by a test-panel using a 10 step scale (0 = very smooth; 10 = very rough).

VideometerLab®

- Records images
- 18 channels
- UV-NIR area



What did we do?



Step 1: To correct for most of the colour differences the raw images were pre-processed with Multiplicative Scatter Correction (MSC)⁽²⁾.

Step 2: A Partial Least Squares (PLS) regression model was made between the values (mean and std) for the image pixels for each sample and a visual inspection of the surface roughness as the prediction measurement.

Result: A low-error PLS model with a good correlation between the predicted and the measured values.

Conclusion

VideometerLab[®] can be used as a fast method to determine the roughness of varying surfaces. If the right pre-processing is applied it is possible to build a model which can predict the roughness.

References

 (1) www.videometer.com
(2) Martens, H. and Næs, T. (1989): Multivariate calibration, Chichester: Wiley.