

Miniature Mass Spectrometer Signal Processing Based on EEMD Feature Enhancement

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Abstract

RATIONALE: The high sensitivity of the miniature mass spectrometer plays an irreplaceable role in rapid on-site detection. However, its analysis accuracy and stability should be improved due to the influence of sample pretreatment and use environment. The present study investigates the processing effects of EEMD feature enhancement methods on the determination coefficient and relative standard deviation of caffeine mass spectrometry signals. **METHODS:** This paper employs the EEMD method combined with polynomial curve fitting to enhance the characteristics of seven Caffeine mass spectrum signals with different concentrations and fifteen groups of Caffeine mass spectrum signals with the same concentration, and the wavelet analysis method was used for comparative verification. The determination coefficient and relative standard deviation of the two methods were compared. **RESULTS:** We found the EEMD method's capability in adaptively decomposing Caffeine mass spectrum signals is better than wavelet analysis method. The determination coefficient of the EEMD enhanced feature is better than 0.999, and the relative standard deviation is better than 2%, and both are better than wavelet analysis methods. **CONCLUSIONS:** The feature enhancement processing using the EEMD method has significantly improved the determination coefficient and relative standard deviation of the sample curve, improving the accuracy and stability of the data and providing a new way for miniature mass spectrometer signal processing.

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