Quantitative Analysis Theories Based Molecular Probe Technique
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Project abstract
The presence of practically unavoidable matrix effects and background interference effects from the spectroscopically active compounds other than the analytes of interest in real-world complex samples can significantly affect the precision and accuracy of quantitative results of optical chem/bio sensing techniques, and hence greatly hinder the application of optical chem/bio sensing techniques to real-world complex samples. This proposal aims to harmoniously combine chemometrics with optical chem/bio sensing techniques, and develop advanced chemometric theories and methods applicable to the field of optical chem/bio sensors which includes: 1) novel calibration strategy based on molecular probes and background projection, 2) novel optimization strategy for parameters of calibration models based on standard addition samples, 3) generalized standard addition multivariate calibration method for quantitative analysis of real-world complex samples. Under different conditions, these advanced chemometric methods can solve the problems of matrix effects and background interference effects, and hence realize the quantitative analysis of real-world complex samples using optical chem/bio sensing techniques. The most significant contributions from this research will be: 1) to extend research direction in chemometric field, 2) to greatly improve the precision and accuracy of the results of optical chem/bio sensing techniques, 3) to open up an avenue for quantitative analysis of real-world complex systems using optical chem/bio sensing techniques in fields such as biomedical sciences, food safety and environmental protection.