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Experimental and computational decomposition of complex biomedical samples

Biomedical products like vaccines, therapeutic allergen products or antibody preparations are complex formulations of proteins and excipients. Their quality is of great interest for patient safety. This why it is strictly controlled according to European and national guidelines and legislation often involving batch release testing and animal experiments.

Raman spectroscopy is investigated as an alternative method to study the chemical composition of biomedicines and to ensure the high quality of the product. Acknowledging the dominance of excipients spectra we explore whether and how it will be possible to recover protein spectra from the spectrum of the full product. To reach this goal both experimental and computational techniques are used: experimental methods include dialysis, sample concentration or freeze drying. Computational methods aim to differentiate between protein and excipient spectra using machine learning algorithms to unmix spectra. We discuss how a combination of experimental and analytical methods can lead to a characterization of product components based on the product's Raman spectral fingerprint.