Title: Drop coating deposition Raman spectroscopy of biologically important molecules

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Abstract: The thesis addresses various applications of drop coating deposition Raman (DCDR) spectroscopy. The first part tackles the capability of detecting agricultural (thiram, bentazon, picloram) and food (melamine) contaminants. Moreover, the detection of melamine from intentionally blended real infant formula was investigated. It was demonstrated that for successful detection, not only the pre-concentration, but also the spatial segregation of compounds together with potential interaction between them could be crucial. DCDR was shown to be a powerful yet simple approach for detecting contaminants. The second part deals with DCDR application for studies of dried phospholipids. It includes the discussion of drying dynamics of liposomal suspension droplet, comparing dried patterns (smooth/nanostructured substrate, homogeneous/non-homogeneous suspension) and analysing the difference between DCDR spectra and Raman spectra acquired directly from suspension (Raman tweezer microspectroscopy). Finally, conformational changes in the dried deposit triggered by heating (the thermotropic behaviour) or by drying at different relative humidity were monitored. DCDR showed great potential to contribute to the investigation of fundamental properties of biomolecules in the absence of water. As straightforward as the method is, it provides valuable information, combining the analysis of the drying process and the observation of the dried pattern with detailed spectroscopic study by Raman spectroscopy.

Keywords: Raman spectroscopy, drop coating deposition Raman (DCDR), hydrophobic substrate, drying dynamics, contaminant, phospholipid, phase transition