**SPECTROSCOPIC IMAGING OF COMPACTED PHARMACEUTICAL TABLETS**

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**Motivation**

Great interest is often focused on the distribution of different components in the tablet as this would affect the integrity of the tablet and ultimately the bioavailability and effectiveness of the pharmaceutical product. This poster presented the application of attenuated total reflection infrared spectroscopic imaging method to study tablet compaction in situ, including:

- Revealing the distribution of different components in a tablet
- Quantitative analysis of the imaging data with univariate (single band integration) and multivariate approaches (classical least square).
- Studying the effect of additives and humidity to the compaction properties such as the density distribution at the surface of the tablet.

**Approach**

- In situ, Tablets are compacted directly on the diamond and measurements are followed without removing the tablets.
- Custom made compaction cell for FTIR images acquisition.
- Compaction pressure used = 120 MPa
- Torque = 100 mN
- Focal plane array detector
- Classical Least Square (CLS) data treatment
- 1000 data points for each spectrum, 4096 spectra

**Classical Least Square (CLS) data treatment**

A spectral data cube containing 1000 data points for each spectrum, 4096 spectra and 3 components in the system, the size of the matrix D, T and C will be 4096 x 1000, 3 x 1000 and 4096 x 3 respectively. T represents the pure components matrix and C represents the “concentration” matrix.

**Reference:**


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**Conclusions**

- Distribution of different components in a compacted tablet has been studied in situ without the need of staining or chemical marking of components.
- With the aid of the new compaction cell, the compaction force can be controlled and measured which lead to the possibility of studying the effect of compaction force on distribution of different components in a tablet.
- Close agreement between the results obtained from both multi- and univariate analysis demonstrated the reliability of the multivariate approach.
- The power of multivariate approach was demonstrated to distinguish different components when the absorption bands overlap. This approach is extremely useful for the analysis of formulations containing many ingredients.
- The addition of 5 wt% MgS increases the density of the tablet by lubricating the HPMC particles causing an increase in absorbance which was detected via FTIR imaging. This quantitative information is important for design of tablets with high resistance to shock and abrasion and for optimisation of tablet production in pharmaceutical powder compaction technology.

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