# 3D mapping as an analytical tool for investigating drug particles

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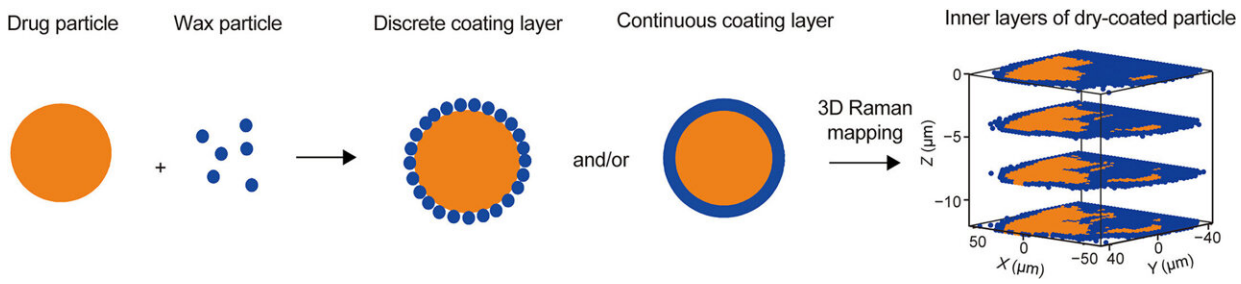


Graphical abstract. Credit: *Journal of Pharmaceutical Analysis* (2023). DOI: 10.1016/j.jpha.2023.02.004

A study conducted by researchers from the University of Chemistry and Technology in Prague sheds light on the properties and performance of dry-coated paracetamol particles, utilizing carnauba wax as the coating agent. The study, published in the *Journal of Pharmaceutical Analysis* employed advanced Raman mapping techniques and provides valuable insights into the thickness, homogeneity and dissolution characteristics of the coated particles.

The research focused on utilizing carnauba wax as a dissolution retardant to improve the drug delivery properties of paracetamol. By employing non-destructive Raman mapping, the scientists were able to examine the coated particles without altering their structure. This unique application of Raman mapping techniques applied to dry-coated particles revealed

the presence of two distinct forms of wax on the surface of paracetamol particles, forming a porous coating layer.

The first form involved intact wax particles residing on the surface of paracetamol, adhering to other wax particles present. The second form consisted of deformed wax particles spread across the surface. This unique coating structure provided a porous layer, offering promising potential for controlled drug release.

Remarkably, the study found that the coating thickness exhibited significant variability in the range of few microns, regardless of the final particle size fraction. This finding highlights the need for precise analytical method to characterize the coating thickness in pharmaceutical products to ensure optimal drug release profiles.

Furthermore, the researchers confirmed the ability of carnauba wax to effectively decrease the dissolution rate of paracetamol through experiments with powder and tablet formulations. The dissolution rate was observed to be slower for larger coated particles, demonstrating the influence of particle size on drug release kinetics.

Importantly, the study emphasized the critical role of subsequent formulation processes, such as tableting, in further reducing the dissolution rate. These findings underscore the significant impact of formulation techniques on the final quality and performance of pharmaceutical products.

Dr. Georgia Koutentaki commented on the implications of the research, stating, "Our investigation highlights the potential of carnauba wax as a valuable coating agent for enhancing the performance of fast-dissolving drugs like paracetamol. By understanding the coating structure and its impact on dissolution rates, we can optimize drug delivery systems and develop more effective pharmaceutical formulations."

The findings of this research hold considerable promise for the pharmaceutical industry, providing a deeper understanding of dry-coated paracetamol particles and their potential applications for controlled drug release. The development of improved drug delivery systems has the potential to enhance patient experiences and optimize therapeutic outcomes.

**More information:** Georgia Koutentaki et al, 3D Raman mapping as an analytical tool for investigating the coatings of coated drug particles, *Journal of Pharmaceutical Analysis* (2023). DOI: 10.1016/j.jpha.2023.02.004

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