

Crystallographic Landscape of Electron Diffraction: *Novel Applications for the Pharma and Agrochemical Industry*



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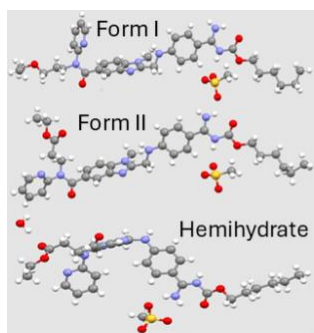
Crystallographic Landscape of Electron Diffraction Novel Applications for the Pharma and Agrochemical Industry

Electron Diffraction (3D ED / microED) has been rapidly evolving as a complementary technique for SC-XRD experiments.^[1] Continuous rotation ED experiments work in the same manner as SC-XRD experiments, overcoming the bottle-neck problem: crystal size. Though the bottleneck now becomes the instrumentation. Dedicated electron diffractometers^[2] make the technique more accessible, resulting in ease of use. In fact, in the last 3 years, there has been an increase in the number of publications arising from such devices.^[3] Especially in the field of pharmaceutical solid forms. We would like to show case, not only the technology, but emphasize in the advantages and capabilities of having a dedicated device for electron diffraction experiments. Especially for the Pharmaceutical and (Agro-)Chemical companies. Moreover, highlight new fields of applications like automation in “crystal mapping” for phase or impurity identification and present some studies where ED has been a game changer for API’s structure elucidation.^[4]

Furthermore, you will learn about the new applications of ED:

- For polymorph screening
- Benefits on amorphous materials,
- Relevance in process development
- Applications in Quality Control and Formulation
- Importance in the IP world.

Especially, when very little amounts of sample are present or other available analytical techniques fail to provide an answer.



Various polymorphs of Pradaxa^(R)



Meta-stable Paracetamol^(R) Form II

References:

- 1) T. Gruene, E. Mugnaioli. Chem. Rev. 2021, 121, 11823-11834.
- 2) There are two commercial companies that have developed and sell electron diffractometers: Eldico Scientific AG, Rigaku. a) P. Simoncic, et. al., Acta Cryst., 2023, E79, 410-422. b) S. Ito, et al., CrystEngComm., 2021, 23, 8622 – 8630.
- 3) Personal (short) selection of a growing list of publications a) J. F. Woods, et. al., Nature Communications, 2023, 14, 4725. b) D. T. Ungur, et. al., Cryst.Eng.Comm., 2024. 26, 4295 – 4304. c) E. Biehler, et. al. J. Appl. Cryst. 2025. 58, 398-411.
- 4) a) P. Sieger, et. al., European Journal of Pharmaceutical Sciences. 2023,186, 106447. b) D. T. Ungur, et. al., CrystEngComm, 2024,26, 4295-4304.