Rapid Screening and Manufacturing of Co-crystals via Thermal Ink Jet Printing for Pharmaceutical Applications

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Co-crystals have attracted the interest in pharmaceutical industry as it offers unique possibilities not only to enhance solubility and dissolution properties of the API but also to provide better stability[1]. Thermal ink-jet printing (TIJP) is shown to be a rapid (minutes), cheap, easy method through which we can prepare pharmaceutical co-crystals. It offers a wide range of potential nontoxic co-crystal forms, which can be formed by means of intermolecular interactions, such as hydrogen bonding by carefully selecting drug–coformer pairs. The small droplet size (5–15 pL) leads to rapid evaporation of the solvent and crystallization of any solutes, which in turn favors isolation of metastable forms[2]. Some APIs require the use of particle-size reduction methods in order to increase the dissolution rate as a route to improving bioavailability for orally administered drugs. The size reduction approach to faster dissolution of micron- and nanometer-sized API particles is now a significant area of research for a number of pharmaceutical and drug delivery companies[3]. Metronidazole belongs to the family of nitroimidazole drugs which is used as an antibiotic and antiprotozoal drug and is also used with other antibiotics to treat pelvic inflammatory disease, endocarditis, and bacterial vaginosis. Gallic acid is a dietary polyphenolic acid and possesses anti-oxidant, anti-microbial, anti-cancer properties etc., apart from having various applications in drug industry. Organic solutions of Metranidazole and Gallic Acid were rapidly dispensed via jet dispensing by varying the drug–coformer stoichiometric ratio and the obtained co-crystals were characterized through Powder X-Ray diffraction(PXRD), Differential Scanning Calorimetry(DSC) and Scanning Electron Microscope(SEM). The rate of printing allows to control particle size which is relevant in pharmaceutical applications.

References:


Key Words: Co-Crystal, TJIP, API, Metronidazole, Gallic Acid