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### An investigation into multiparticulate units printability by selective laser sintering

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Selective laser sintering (SLS) is a 3D printing process, described as a suitable technology for diverse dosage forms and highly detailed structures fabrication (1). Its application in multiparticulate units (MPU) preparation is scarce. The aim of this work was to assess the printability of MPU using SLS.

The MPU consisted of: model drug (10%): ibuprofen (IBU)/caffeine (CAF); polymer (87%): poly(ethylene)oxide (PEO, Polyox WSRN12K)/ethyl cellulose (ETC, Ethocel)/methacrylic acid-ethyl acrylate copolymer (EUD, Eudragit L100-55); colorant (3%): Candurin® Gold Sheen. "Large" (2 mm) and "small" (1 mm) MPUs were printed using SLS printer Sintratec Kit (Sintratec AG). High granule true density and low particle fines fraction, i.e. high yield, were identified as printability indicators.

It was observed that large MPU exhibited higher true density, as well as higher particle fines concentration, i.e. lower yield in the desired particle size. True density was more affected by the model drug than particle size and CAF-MPU exhibited higher true density (1.21-1.38 g/ml) than IBU samples. ETC-MPU exhibited the lowest true density (1.19-1.22 g/ml) and particle fines fraction (3.6-18.5%), indicating the high yield obtained. EUD-MPU true density was the highest (1.23-1.38 g/ml), due to prominent binding of EUD fine particles. PEO-CAF samples exhibited extremely high particle fines fraction (32.6-48.9%).

SLS printing may be used for MPU preparation. Preliminary data indicated that smaller MPU may be advantageous for further processing into tablets, while larger MPU are challenging to obtain due to relatively low yield.

#### References

1. Fina F. et al. Int. J. Pharm. 529(1-2), 285-293 (2017).

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