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Fused deposition modelling (FDM) in pharmaceutical technology

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Fused Deposition modelling (FDM) is one of the most widely used 3D printing technology due to the absence of unbound loose powder, no need for solvent removal, low equipment price, high equipment diversity, high content uniformity, and excellent mechanical properties. FDM involves extruding heated plastic filaments (thermoplastic polymers and their composites) through a nozzle tip to deposit layers onto a platform (printlets) from a digital model. The printing materials should be able to flow out the printing head after heated and then be quickly solidified once printed. However, this technology suffers from major drawbacks that include the hazard of drug degradation due to the high temperature used beside slow release rate of drugs. Several researchers mentioned that controlling the temperature is carried out by using different polymers mixtures and additives (e.g. filler). Also using rapidly dissolving polymers and modification of solid dosage forms pattern and geometry lead to increase the release rate of drugs.

The aim of this research is to improve printlets quality by studying the effect of materials attributes and process parameters and furthermore comparison of the properties printlets prepared from API-free and API-containing filaments and investigation of various loading methodologies with additional APIs.