

## عنوان مقاله:

Process Parameter Optimization of 3D-Printer Machine Using Response Surface Method for Printing Hydroxyapatite/Collagen Composite Slurry

## محل انتشار:

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## خلاصه مقاله:

Nowadays, various 3D-Printer technologies are commercially available. However, those printers could only be used for a certain material provided by the printer manufacturers. For new material, the commercial printer could not be employed directly and needs to be modified and its printing parameter has to be optimized to fit the property of the new material. This paper aimed to find the optimum parameters (print speed and layer height) based on printability material. The new material that would be developed was a composite of bioceramic powder (hydroxyapatite) and polymer (collagen) in the form of slurry with ratios of 99.84% (w/v) and 0.16% (w/v). While the printer was a commercial 3D-Printer machine with modification on its cartridge container and bracket. The printing parameters were layer height (0.65, 1.0, 1.35 mm) and print speed (14.4, 25, 35.6 mm/min). Optimization of the printing parameter used Response Surface Method (RSM) with 13 sets of specimens. Test specimens for defining printable material were printed in the form of line shape and a rectangular shape for case study. Printability as a responding of the optimum parameter setting was defined on the basis of 5%-maximum dimension error of the printed specimen compared to the 3D-CAD data. Data obtained was analyzed using ANOVA. The results show that the optimum setup printing parameter were 10.009 mm/min for print speed and 0.505 mm for layer height, respectively with the error dimension obtained from the experiment was 0.013 mm (0.59%) lower than that of the permitted error of 5% (0.125 mm).

**کلمات کلیدی:**

Hydroxyapatite, collagen, Slurry, 3D printer, optimum parameter, Printability

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