Sintering temperature effects on the properties of stainless steel 316L compact fabricated by metal injection moulding

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ABSTRACT

Stainless steel (SS) 316L powder was prepared with polyethylene glycol (PEG), polymethyl methacrylate (PMMA), and stearic acid (SA) with powder loading 61 vol.%. The sintering parameter in metal injection moulding (MIM) process was manipulated to study its effects on physical, mechanical, and corrosion properties of SS 316L compact. The compacts was fabricated by MIM, and then sintered at 1,100, 1,200, and 1,300°C for 3 h using argon. Then, the compact was tested for density, shrinkage, tensile strength, microstructure, and corrosion behaviours. The compacts sintered at 1,300°C demonstrated highest relative density (94%) and tensile strength (309 MPa), with small porosity was noticed from microstructure. The corrosion potential (Ecorr) and corrosion current (Icorr) values showed higher corrosion resistance which were –3.25E-01 V and 4.93E-0.7 A.cm–2, respectively. The SS 316L compacts with sintering temperature of 1,300°C for 3h produces excellent physical, mechanical and corrosion properties compared to other temperatures. The results demonstrate that the proposed algorithm is useful to obtain accurate models, even for high-dimensional parameter identification.

KEYWORDS

SS 316L; metal injection moulding; MIM; manufacturing technology; sintering temperature; argon atmosphere; sintered density; mechanical properties; optical microstructure.

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NOTES

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