

## **Controlling the sintering response in the development of multilayered components produced via powder injection molding route—a review**

### **ABSTRACT**

The development of multilayered components is essential to modern-day technological operations. Several routes to develop these components have emerged, but powder injection molding (PIM) has the benefits of simplicity, non-formation of a third layer, and near-net-shape production. However, PIM presents the challenges of shrinkage mismatch and formation of undesirable phases, which deteriorate the quality and integrity required in multilayered components. The sintering process has been identified as the key step in this route where defects originate; therefore, its parameters (temperature, time, rate, and atmosphere) must be carefully controlled and monitored. This review touches on various processing routes in developing multilayered components, cuts across the achievements made so far in the PIM route majorly in controlling the sintering response of layers, and then sets some guidelines and highlights possible gray areas for future research studies. Some measurement techniques deployed to evaluate shrinkage during sintering, and numerical simulation analyses of PIM processes are also described and analyzed. Thus far, only few mechanical properties have been successfully evaluated in the literature and are discussed in this article.

**Keyword:** Multilayered components; Powder injection molding; Shrinkage mismatch; Sintering; Mechanical properties; Eta carbide