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Abstract

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The diversity of powder-based products in our world may be attributed to the variety of materials that can be used. Ceramics, metals, carbons, and pharmaceuticals all have powder manufacturing products that have been in circulation for years. In some cases, powder products are considered a mature technology. That is, there is not much demand for innovation. However, with the rising need for lessened environmental impact, this in turn demands increased efficiency in both manufacturing and formed end-products. Cold sintering is a technique under development which utilizes chemistry within the manufacturing of powdered products to improve various material properties, with a specific improvement in strength compared to conventionally prepared samples, at significantly lower temperatures. So far, this technique has been demonstrated extensively in ceramics, resulting in fully densified samples post-compaction. The technique has also been shown to significantly increase the green strength of metals, and even graphites. Variation in preparation technique is used to improve strengthening of compacts. Samples in powder and/or compact form are characterized to understand the respective strengthening mechanisms of both material systems. Metal and graphite systems leave ample room for investigation into the theory and application of cold sintering in these materials. Potential application of cold sintered materials includes use in green machining, soft magnetic composites, and bipolar plate production.