

Plasma assisted low temperature carburizing process of austenitic steels.

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Abstract.

To enhance the surface properties of austenitic stainless steels widely used in biomedical applications, and to improve their wear resistance, a novel low-temperature plasma-assisted carburizing treatment was developed and optimized by tuning the methane concentration and the treatment time. Compared with the untreated material, the surface hardness increased by approximately 1.4 times, while the wear rate decreased by about a factor of 20. These improvements potentially extend the applicability of such steels, including components produced by both conventional and additive manufacturing processes. However, the reported results were obtained under laboratory conditions using small-size samples. A conceptual design of a prototype reactor specifically conceived to treat larger components with complex geometries typical of industrial applications will be also discussed.