# Enhancing mechanical properties of CoCrFeNiMn high-entropy alloy with carbon waste materials

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The CoCrFeNiMn alloy is known for excellent ductility and strain-hardening capacity; it suffers from the drawback of comparatively low yield strength. Efforts to enhance yield strength have been pursued either through thermo-mechanical processing or by introducing reinforcing particles. Conventional casting methods are generally used to achieve these improvements, although powder metallurgy offers an alternative approach. Beneficially, powder metallurgy – particularly mechanical milling – promotes the homogeneous distribution of reinforcement particles and significantly refines the microstructure of the material.

In this study, carbon nanomaterial waste was used to synthesize the carbide particles via mechanical alloying, which were subsequently incorporated into the CoCrFeNiMn alloy. Using the carbon waste derived from the microwave plasma gasification, the proposed method complies with the principles of a circular economy.

The synthesis of carbide particles was optimized according to the results of XRD and XRF analysis, with a focus on minimizing the contamination during the alloying process. The resulting carbides were uniformly distributed throughout the CoCrFeNiMn alloy, ultimately improving the mechanical properties such as hardness and compressive yield strength.

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