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# Towards Biomedical Metallic Glasses: Exploring CuAgZr Alloys through High-Throughput Methods and Machine Learning

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This study focuses on CuAgZr metallic glasses (MGs), which are notable for their potential in biomedical applications thanks to their exceptional strength, resistance to corrosion, and antibacterial properties. By employing a synergistic approach that combines combinatorial synthesis, high-throughput characterization, and machine learning, we have conducted a thorough examination of the mechanical attributes of CuAgZr MGs. Our findings indicate that the presence of high oxygen levels in Cu-rich areas, resulting from post-deposition oxidation in regions of less dense packing, markedly influences the mechanical performance of these alloys. Additionally, our research uncovers that nanoscale structural nuances play a significant role in determining the plastic yield and flow behavior of the alloys. Among various machine learning models evaluated, the multi-layer perceptron algorithm stood out, delivering accurate predictions of hardness for alloys not previously tested, thereby offering insightful directions for ongoing material research. This investigation underscores the efficacy of leveraging combinatorial synthesis, high-throughput analysis, and machine learning to accelerate the development of new metallic glasses with enhanced mechanical properties and cost-effectiveness.