For example, in battery anodes or cathodes, the presence of refractory elements can increase thermal stability, while more active elements can enhance capacity and voltage output. Additionally, the multiphase structures in HEMs are less prone to phase transitions that can adversely affect performance, such as dendrite formation or volume expansion that occurs in conventional materials like graphite or silicon. By minimizing these issues, HEMs offer a more stable and reliable option for high-capacity energy storage.

HEMs are poised to revolutionize next-generation energy storage systems due to their high capacity, long cycle life, and excellent thermal and chemical stability. These materials can be tailored for a range of applications, from EVs requiring fast charging and long-range capacity to grid storage systems that demand high efficiency and long-term performance. Moreover, HEMs' resistance to chemical degradation and their ability to maintain high electrochemical performance under demanding conditions make them an ideal choice for portable electronics, which require both lightweight and high-performance energy storage solutions. The development of HEM-based materials could help overcome some of the major limitations of current battery technologies, leading to more sustainable, efficient, and durable energy storage solutions for a wide range of industries and applications.

In conclusion, the diverse applications of functional HEAs and compounds are a testament to their versatility and potential impact on various industries (Figure 1.20). As research continues to uncover new properties and improve the understanding of HEMs, their applications are expected to expand, leading to innovative solutions in engineering, technology, and science.

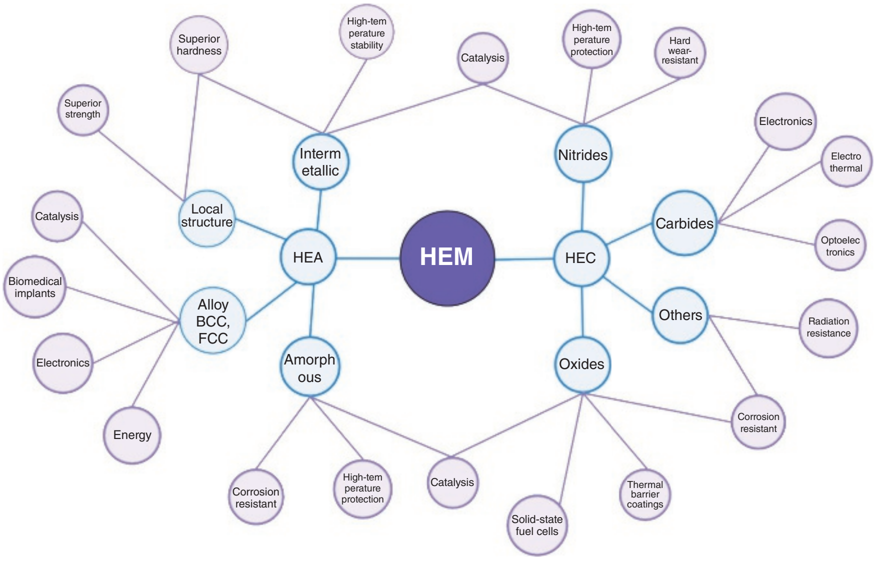

Figure 1.20 Schematic diagram of different classifications and applications of high-entropy functional materials.

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