# UNVEILING THE STRUCTURE OF HIGH-ENTROPY MATERIALS USING MULTI-EDGE X-RAY ABSORPTION SPECTROSCOPY

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High-entropy materials (HEMs) are a class of materials comprising five or more principal elements in equal or nearly equal atomic proportions. The very first HEMs, discovered in the early 2000s [1, 2], were high-entropy alloys (HEAs). Since then, the principles of entropic engineering have been applied to a wide range of materials, including oxides, chalcogenides, hydroxides, organometallic frameworks, and polymers [3]. The defining characteristic of HEMs is their high configurational entropy resulting from the mixing of multiple elements, which favours the formation of a compositionally and locally disordered atomic structure. The local environment around each element is determined by many factors such as its size, charge and electronegativity, as well as the presence of other elements. Deciphering the local atomic structure of HEMs is a crucial but challenging task to understand their properties. X-ray absorption spectroscopy (XAS), providing an insight into the local electronic and atomic structure of a specific element, is ideally suited for studying multicomponent compounds like HEMs. This report will review the use of multi-edge XAS combined with atomistic simulations to study HEMs [4] and discuss several examples of its application to multicomponent oxides and alloys.

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