

# Revitalisation of Group IV metal-oxo clusters: Synthetic approaches, structural motifs and applications

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Group (IV) metal oxo clusters garner a lot of attention due to their unique and interesting electronic properties, which can lead to different applications including catalysis, sensing, medicine and other industries.<sup>1,2</sup> In marked contrast to polyoxometalates (POMs) which are a well-studied and diverse series of clusters based primarily on group V & VI metals in their highest oxidation state, group IV clusters are comparatively less explored. These clusters exhibit distinctive structural features, chemical reactivity, and electronic structure. Nevertheless, their full potential has yet to be fully realized due to the lack of deeper understanding regarding their structure and formation mechanisms, inherent traits, and intricacies in their design, which could ultimately enable significant customization of their properties and overall behaviour. Considering the recently observed reignited interest in the chemistry of Group IV molecular species, the scope of this work is to bring onto the readers the main chemical characteristics of the family of titanium, zirconium, and hafnium-based clusters, their structural features and their potential in future applications.

## References:

- [1] D. Van Den Eynden, R. Pokratath and J. De Roo, *Chem Rev*, 2022, 122, 10538–10572.
- [2] H. N. Miras, J. Yan, D. L. Long and L. Cronin, *Chem Soc Rev*, 2012, 41, 7403–7430.