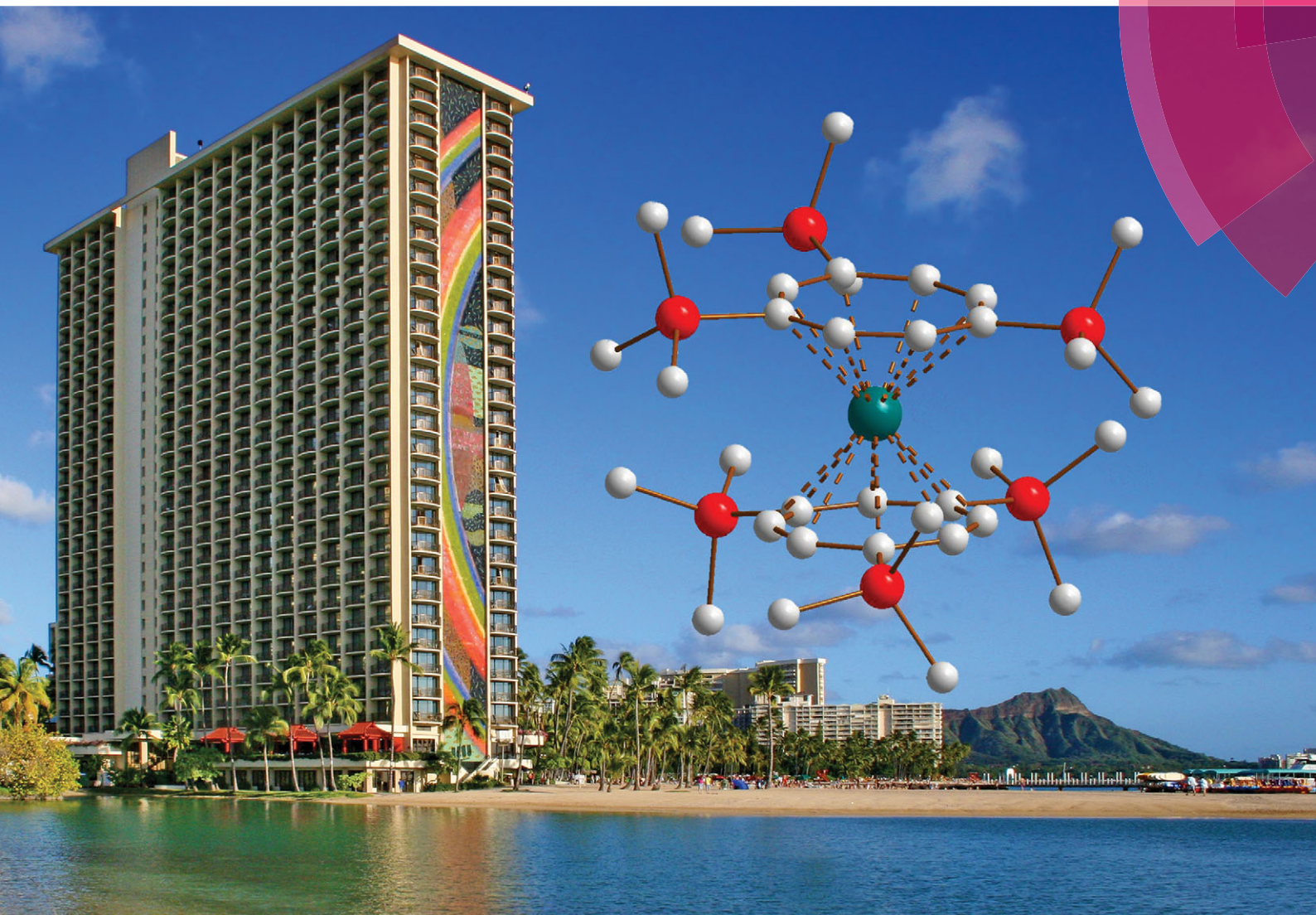


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Frontiers of organo-f-element chemistry

Frank T. Edelmann^{*a} and Peter Junk^{*b}

It is with a sense of pride that we can present to you this themed issue of *New Journal of Chemistry*. The issue was planned in connection with a symposium entitled “Frontiers of Organo-f-Element Chemistry” (Symposium #125) to be held at the Pacificchem 2015 conference in Honolulu, Hawaii, USA (December 15–20, 2015). The two-day symposium was jointly organized by Yaofeng Chen (P. R. China), Paula Diaconescu (USA), David Emslie (Canada), Frank T. Edelmann (Germany), and Peter Junk (Australia). This symposium is considered to be the major international gathering of organo-f-element chemists in 2015. The present *NJC* themed issue is scheduled to appear near the time of the conference. It can thus be considered an excellent snapshot of the state of the art in this steadily growing and important field of organometallic chemistry. Leading experts from all over the world working in the organolanthanide and

organoactinide areas made valuable contributions to the issue.

Although the lanthanide and actinide series are normally displayed as “footnotes” in the Periodic Table, many of these elements play crucial roles in a variety of today’s high-tech applications. For the rare-earth elements, magnetism, luminescence, and catalysis are the most important areas for practical applications. Organolanthanide compounds are increasingly employed in homogeneous catalysis, as volatile precursors in materials science, and in organic synthesis.

Steve Jobs’s motto “Think different!” also applies to the chemistry of the rare-earth and actinide elements. The organo-metallic chemistry of these elements differs largely from that of the d-transition metals. Generally accepted principles of organo-d-transition metal chemistry do not apply to organo-f-element compounds. This includes the well-known 18-electron

rule, σ -donor/ π -acceptor metal–ligand bonding, the formation of stable carbynls, olefin and alkyne complexes, as well as the formation of stable $M=O$ or $M\equiv N$ multiple bonds. Direct metal–metal bonds between lanthanide and actinide atoms have not yet been realized. In addition, their highly oxophilic character renders organo-f-element compounds generally very sensitive toward air and moisture, adding to the very special character of these materials. On the other hand, unprecedented molecular structures and reaction pathways (e.g. C–H activation and CO oligomerization) uncommon for d-transition metals account for the great fascination of organolanthanide and organoactinide chemistry.

The contributions compiled in this *NJC* themed issue provide an excellent overview of recent developments at the “frontiers” of organo-f-element chemistry.

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