

# "Bottled" spiro-doubly aromatic trinuclear $[\text{Pd}_2\text{Ru}]^+$ complexes

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## Abstract

Following an ongoing interest in the study of transition metal complexes with exotic bonding networks, we report herein the synthesis of a family of heterobimetallic triangular clusters involving Ru and Pd atoms. These are the first examples of trinuclear complexes combining these nuclei. Structural and bonding analyses revealed both analogies and unexpected differences for these  $[\text{Pd}_2\text{Ru}]^+$  complexes compared to their parent  $[\text{Pd}_3]^+$  peers. Noticeably, participation of the Ru atom in the  $\pi$ -aromaticity of the coordinated benzene ring makes the synthesized compound the second reported example of 'bottled' double aromaticity. This can also be referred to as spiroaromaticity due to the participation of Ru in two aromatic systems at a time. Moreover, the  $[\text{Pd}_2\text{Ru}]^+$  kernel exhibits unprecedented orbital overlap of Ru  $d_{z^2}$  AO and two Pd  $d_{xy}$  or  $d_{x^2-y^2}$  AOs. The present findings reveal the possibility of synthesizing stable clusters with delocalized metal-metal bonding from the combination of non-adjacent elements of the periodic table which has not been reported previously.

## Indexed keywords

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