Our group was devoted to the research of metal string complexes in past decades. We believe that the thinnest metal wire could be applied to practical applications in molecular electronics in future. We successfully synthesized two kinds of ligand in order to extend the study of metal strings. First, the new decametal string complex [Ni\(_{10}\)\(\eta^8\)bdpdany]\(\mu_2\)Cl\(\sigma\)(NCS)\(_2\) was successfully synthesized with H\(_4\)bdpdany ligand. The crystal structure of [Ni\(_{10}\)(\(\eta^8\)bdpdany)]\(\mu_2\)Cl\(\sigma\)(NCS)\(_2\) shows that all of the bdpdany\(^{-}\) ligands bind metal in all-syn conformation and the X-ray structural studies reveal the internal Ni-Ni bond distance is ca. 2.36-2.23 Å. Second, the heteronuclear [Ru\(_4\)Ni\(_2\)(DAniDANy)(OAc)]Cl complex was successfully synthesized with H4DAniDANy ligand. The crystal structure of [Ru\(_4\)Ni\(_2\)(DAniDANy)(OAc)]Cl is shown in Figure 1b. Ru(1)-Ru(2) is about 2.288(1) Å. Ru(1)-Cl is 2.469(2) Å . Ru-N distances are 2.04-2.09 Å. Ru(2)-Ni(1) is 2.469(1) Å. This distance is close enough to have some overlap between Ru and Ni. Magnetic study shows it has three unpaired electrons. IVCT band at 890 nm indicates there exists an unoccupied δ* which is similar to Ru\(_2\) dimer. DFT study shows that the three magnetic orbitals are essentially Ru\(_2\) based. Ru\(_1\) and Ni\(_2\) may have weak bonding interaction.

Fig. 1 The crystal structures of [Ni\(_{10}\)(\(\eta^8\)bdpdany)]\(\mu_2\)Cl\(\sigma\)(NCS)\(_2\) and [Ru\(_4\)Ni\(_2\)(DAniDANy)](OAc)Cl.


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