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Two complexes of Sm(II) with crown ethers-electrochemical synthesis, structure and spectroscopy.

Autorzy

Przemysław Starynowicz

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Streszczenie

Two complexes of divalent samarium have been synthesized by electrochemical reduction in methanol–tetrahydrofuran solutions: [Sm(18-crown-6)$(ClO_4)_2$] and [Sm(15-crown-5)$_2$]$(ClO_4)_2$. In [Sm(18-crown-6)$(ClO_4)_2$] the metal cation is ten-coordinate and its coordination sphere comprises six oxygen atoms of the crown ligand and four oxygen atoms from two perchlorate anions. [Sm(15-crown-5)$_2$]$(ClO_4)_2$ shows a sandwich structure with decacoordinate samarium located between two 15-crown-5 molecules. At 77 K both compounds show f–f luminescence originating from the $^5D_0$ level, and also the 15-crown-5 complex shows a weak luminescence in the range 20000–25000 cm^{-1}, which has been tentatively interpreted as originating from $^3P_0$ and $^5H_3$ levels. At room temperature the emission of [Sm(15-crown-5)$_2$]$(ClO_4)_2$ is dominated by broad f–d bands. In the excitation spectra some Fano resonances have been observed. The 18-crown-6 compound is unstable, but the 15-crown-5 compound is fairly stable in air.

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