Raman Spectroscopic Study of a New Type of Room Temperature $ZnCl_2$-$DMSO_2$ Molten Salts

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In this study, Raman spectra of binary zinc chloride-dimethylsulfone ($ZnCl_2$-$DMSO_2$) melts have been measured. The intra-molecular vibrations of group and ionic species have been confirmed and discussed. From the Raman spectrum analysis and discussions, the equilibrium reaction equation about the complex ions forming in the $ZnCl_2$-$DMSO_2$ melt is submitted, such as

$$n\,ZnCl_2 + n(n-2)(CH_3)_2SO_2 \Leftrightarrow 2ZnCl_n^{2-n} + (n-2)\,Zn[(CH_3)_2SO_2]_n^{2+}, \quad (n \geqq 3).$$

However, the Raman spectra reveal that the $ZnCl_4^{2-}$ (375 cm^{-1}) and $ZnCl_3^{-}$ (290 cm^{-1}) complexes are the major ions for the 40 – 90 mol% $ZnCl_2$ melts; furthermore, as the $DMSO_2$ content is increased, the binary melt advantage the forming of $Zn[(CH_3)_2SO_2]_n^{2+}$ complex ion and promote its transport characteristic.

Key words: Raman Spectra; $ZnCl_2$-$DMSO_2$; Complex Ion.