Vibration spectroscopic study of the interaction of tris-(8-hydroxyquinoline) aluminum (Alq₃) with potassium

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Abstract

The interaction between Alq₃ and potassium was studied by using Raman and infrared spectroscopies. Infrared reflection absorption spectroscopy (IRRAS) spectra of Alq₃ films show significant changes after potassium deposition, such as the appearance of new bands and changes in relative intensity. Surface-enhanced Raman scattering (SERS) spectra obtained using the 413.1 nm line of a Kr⁺ laser reveal similar changes. Changes are even more obvious when the 530.9 nm line was used for excitation. Changes in the SERS for excitation with the 413.1 nm line are less obvious due to a strong photoluminescence. The vibrational pattern of potassium-doped Alq₃ cannot be explained by the formation of radical anion by simple charge transfer, indicating the excess electron is not delocalized over the molecule. The observed spectral change suggests that the potassium atom interacts with both nitrogen and oxygen atoms of Alq₃ molecule.

Author Keywords: Tris-(8-hydroxyquinoline) aluminum (Alq₃); Potassium; Raman spectroscopy; Infrared reflection absorption spectroscopy

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