

IR-IR DOUBLE RESONANCE EXPERIMENT OF CH₃F-(*ortho*-H₂)_n CLUSTERS IN SOLID *para*-H₂

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FTIR absorption spectrum of the ν_3 vibrational band of CH₃F in solid *para*-H₂ shows a series of lines at regular intervals, which could be assigned to clusters forming CH₃F-(*ortho*-H₂)_n, with n = 0 to 12^a. However, such a distinct feature appears only in the ν_3 mode but is not observed in the other vibrational modes. In order to solve this problem, we applied IR-IR double resonance spectroscopy using 3 μm OPO laser and 9 μm QC laser to the vibrational bands of CH₃F in solid *para*-H₂. Because, very recently, high resolution cw-QC laser spectroscopy demonstrated a perfect bleaching effect on a spectral peak in ν_3 mode^b. By bleaching the n=1 component of the ν_3 band at 9 μm , we can see a corresponding depletion in the broad spectral feature of the ν_1 band at 3 μm . This simultaneous disappearance of the spectral peaks is a proof of the CH₃F-(*ortho*-H₂)_n cluster model, and it suggests that all the vibrational bands should be explained by the same model.

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