Physics > Atomic and Molecular Clusters

Observation of (N2)2 dimers in free nitrogen and argon-nitrogen clusters

Yu. S. Doronin, M. Yu. Libin, V. N. Samovarov, V. L. Vakula

(Submitted on 15 Jul 2011 (v1), last revised 26 Jul 2011 (this version, v2))

Supersonic-jet luminescence spectroscopy was applied to study vibronic transitions in icosahedral N2 and Ar-N2 clusters having from 100 to 400 particles per cluster. In the case of mixed Ar-N2 clusters, the w->X transitions were observed to occur in single N2 molecules in an Ar environment, that is very much in the same way as in Ar-N2 bulk samples. In N2 clusters, however, a band series was detected which was never observed earlier. In the spectra of Ar-N2 clusters, this new series coexisted with the 'bulk' w->X transitions. Our analysis demonstrated that the series should be assigned to emission of van der Waals (N2)2 dimers from inside clusters. Earlier, such dimers were only observed in molecular beams and gaseous nitrogen, this paper reports their observation in the solid phase of nitrogen suggesting that they may be the basic building blocks of small N2 clusters. Our results can be of interest from the viewpoint of producing polymeric nitrogen since (N2)2 dimers can be considered to be a starting species for its synthesis.

Comments:	The final version will be published in Phys. Rev. A (2011)
Subjects:	**Atomic and Molecular Clusters (physics.atm-clus)**; Other Condensed Matter (cond-mat.other)
Cite as:	**arXiv:1107.3057 [physics.atm-clus]**
	(or **arXiv:1107.3057v2 [physics.atm-clus]** for this version)

Submission history

From: Volodymyr Vakula [view email]
[v1] Fri, 15 Jul 2011 12:45:26 GMT (392kb)
[v2] Tue, 26 Jul 2011 10:56:24 GMT (392kb)

Which authors of this paper are endorsers?