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**Abstract**

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**Electron energy loss spectroscopy studies of nitrogen adsorption on W(100)**









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**Abstract**

Vibrational excitations of nitrogen on W(100) are investigated over the 100–300 K temperature range using elastic and inelastic electron scattering. New vibrational modes of nitrogen are identified that require different mode assignments from previous work. Experimental evidence for a molecular precursor to the atomic  $\beta_2$  phase of adsorbed nitrogen is presented. Coverage dependent studies of vibrational modes suggests conversion between two different molecular surface phases and between atomic and molecular phases. A new ordered nitrogen phase characterized by a  $(4 \times 1)$  LEED pattern is observed. The new phase appears to consist of orthogonal domains of  $p(4 \times 1)$  symmetry that contain atomic nitrogen at the four fold sites (the  $\beta_2$  atomic phase) with additional bridge-bonded nitrogen atoms in the unit cell.

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