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Anchoring to the Nanoworld: Spectroscopic Investigation of Atomic Metal Strings Adsorbed on GaN CHE-CHEN CHANG, CHIEN-HUA LUNG, National Taiwan University — It is now possible to produce structures that are only a few tens to a few nanometers in size using techniques which involve the self assembly or the chemical functionality-guided arrangement of atoms, molecules and nanospecies. Their devices, however, are useless unless they are able to communicate with the outside world and with one another. This study explored the possibility of fabricating metal contacts from the bottom up on semiconductors using a linear metal atom string complex, which was chelated by dipyridylamino ligands and terminated at both ends by one Cl atom each, for CVD. More than 75% of the string complex exposed at 105 K to the GaN(0001) surface was chemisorbed dissociatively, with one of its terminal Cr-Cl bonds disrupted and the other pointing freely outwards. The chelate structure of the adsorbed complex was stable until reaching ∼340 K, at which temperature detachment of some of its ligands occurred. The ligand desorption followed the first-order kinetics, with a desorption energy of 21.5 kcal/mol. The detachment of the ligand from the complex caused the metal chain axis to lie down on the surface. Consequently, the Cr-Cl bond on the free end of the chain interacted with the surface, causing other ligands to desorb from the surface at the higher substrate temperature of ∼540 K.

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