N adsorption on the In/Si(111)–(4×1) surface has been studied using first principles calculations. After adsorbing 0.125 ML of N atoms on the surface, the most stable site shows InN arrangements. Increasing the coverage till 0.25 ML of N atoms, it is possible to form an InN atomic–size wire on the surface. For 0.5 ML of N atoms the stable configuration is a couple of these InN chains. Surface formation energy calculations confirm the stability of the InN atomic wires. The two In chains structure (cleans surface) is stable for N-poor conditions. Increasing the N content, it is evident the formation of an InN atomic wire in a reduced range of chemical potential. From intermediate to N-rich conditions, two InN atomic wires are stable. Projected density of states shows a trend to form In-N and Si-N bonds. Finally, the existence of these atomic-size wires is confirmed by charge density distributions.

**Keywords:** Adsorption, Surface Formation Energy, Atomic-size wire