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Purely substitutional nitrogen on graphene/Pt(111) unveiled by STM and first principles calculations JOSE M. GOMEZ-RODRIGUEZ, ANA MARTIN-RECIO, Dept. Fisica de la Materia Condensada, Universidad Autonoma de Madrid, Spain, CARLOS ROMERO-MUNIZ, PABLO POU, RUBEN PEREZ, Dept. Fisica Teorica de la Materia Condensada, Universidad Autonoma de Madrid, Spain — Nitrogen doping of graphene can be an efficient way of tuning its pristine electronic properties. Several techniques have been used to introduce nitrogen atoms on graphene layers. The main problem in most of them is the formation of a variety of C-N species that produce different electronic and structural changes on the 2D layer. Here we report on a method to obtain purely substitutional nitrogen on graphene on Pt(111) surfaces. A detailed experimental study performed in situ, under ultra-high vacuum conditions with scanning tunneling microscopy, low energy electron diffraction and Auger electron spectroscopy of the different steps on the preparation of the sample, has allowed us to gain insight into the optimal parameters for this growth method, that combines ion bombardment and annealing. This experimental work is complemented by first-principles calculations that provide the variation of the projected density of states due to both the metallic substrate and the nitrogen atoms. These calculations enlighten the experimental findings and prove that the species found are graphitic nitrogen. This easy and effective technique leads to the possibility of playing with the amount of dopants and the metallic substrate to obtain the desired doping of the graphene layer.

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