# X-rays Illuminate Nitrogen's Role in Graphene

## Scientific Achievement

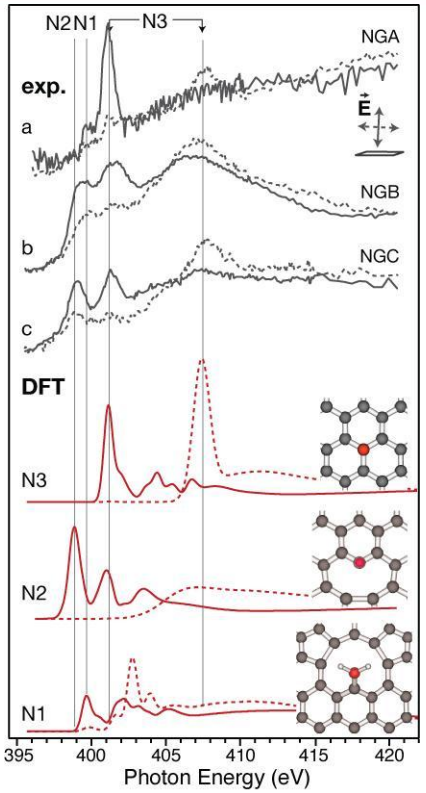
**X-ray study of nitrogen-doped single-layer graphene reveals information on how dopants affect atomic bonding and electronic properties**

## Significance and Impact

**Shows that synchrotron techniques can be excellent tools for studying doped graphene, eyed for use as a contact material in several electronics applications, including solar cells**

## Research Details

- Multiple x-ray techniques were used to study how nitrogen atoms bind to carbon atoms, and how bond types alter the charge-carrier distribution in single-layer (one-atom-thick) graphene
- Several bond types can form in the same graphene sheet, each yielding either excess or fewer charge carriers
- Results show that controlling bond types will be crucial to tuning graphene's properties for specific applications




Top: Experimental x-ray absorption spectroscopy data for three nitrogen-doped graphene (NG) samples (a,b,c). Bottom: Theoretical (computer-generated) data for three types of nitrogen-carbon bonds (N1, N2, N3). Red dots indicate nitrogen atoms.

T Schiros, D Nordlund, L Paĺová, D Prezzi, L Zhao, KS Kim, U Wurstbauer, C Gutieŕrez, D Delongchamp, C Jaye, D Fischer, H Ogasawara, LGM Pettersson, DR Reichman, P Kim, MS Hybertsen, and AN Pasupathy, *Nano Letters* **2012**, 12, 4025–4031

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