Title:	Unravelling charge-transfer in Pd to pyrrolic-N bond for superior electrocatalytic performance
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Abstract:	Fuel-cells require large quantities of Pt for oxygen reduction reaction (ORR) to subvert the activity-loss during prolonged use. Pd can complement Pt in the near future by exhibiting a similar activity and stability in alkaline fuel-cells. Herein we show that by depositing Pd atom-by-atom on an N-doped reduced graphene oxide (NRGO), it is possible to create a strong bond between Pd and pyrrolic-fraction of the N-moieties. This bond further strengthens in the presence of an oxygen containing functional-group accompanied by a profound charge-transfer from the Pd 3d-orbitals to the 2p-orbitals of C, N and O, thereby lowering the Pd-3d binding-energy and the resulting Pd/NRGO exhibits a very high ORR activity (E1/2 = 0.93 V vs. RHE) and stability (ΔE1/2 = 0.013 V after 15 000 cycles). Usually pyridinic-N is considered for imparting high-performance while N-doping creates nearly as many pyrrolic-N in graphene-substrates, the role of which is evidenced in this study.
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