

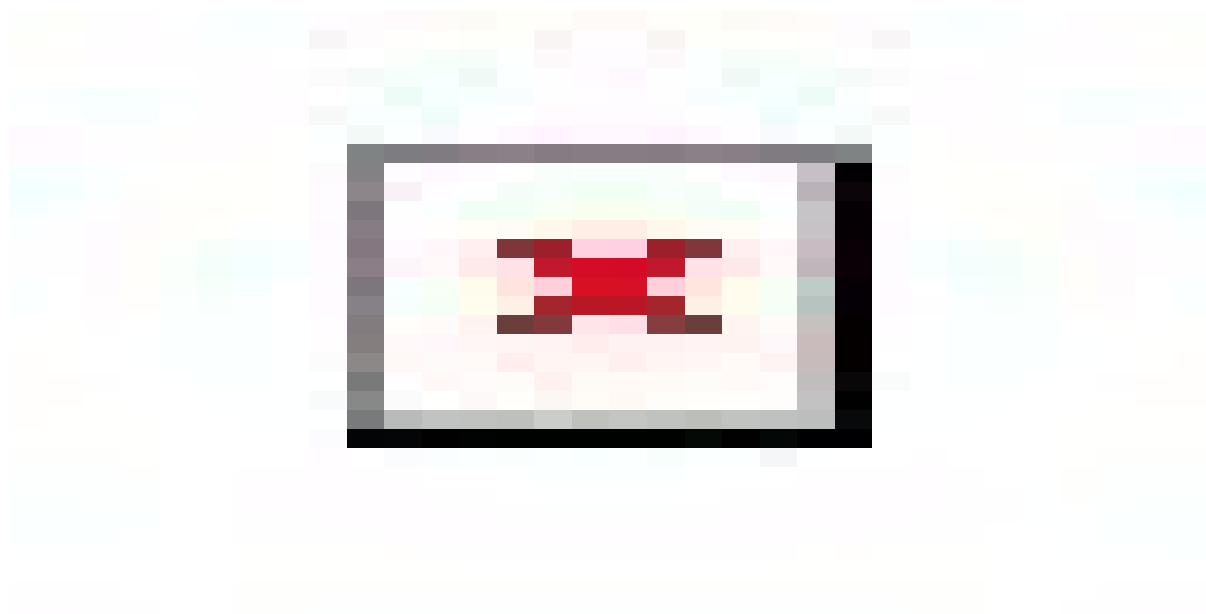


Figure S1. SEM images and particles size distribution of (a) mesoporous Pd nanoparticles loaded on FrGO and (b) mesoporous Pd nanoparticles loaded on rGO without modification by F127, respectively.

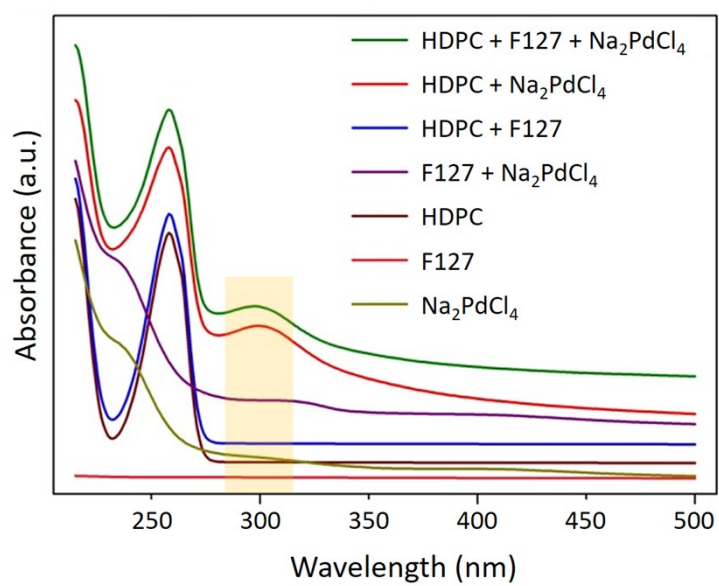


Figure S2 Ultraviolet-visible (UV-vis) absorption spectra of various reaction precursors. Reproduced with permission [Y. Yamauchi *et al.*, *Chem. Commun.* 2014, **50**, 11753-11756.].

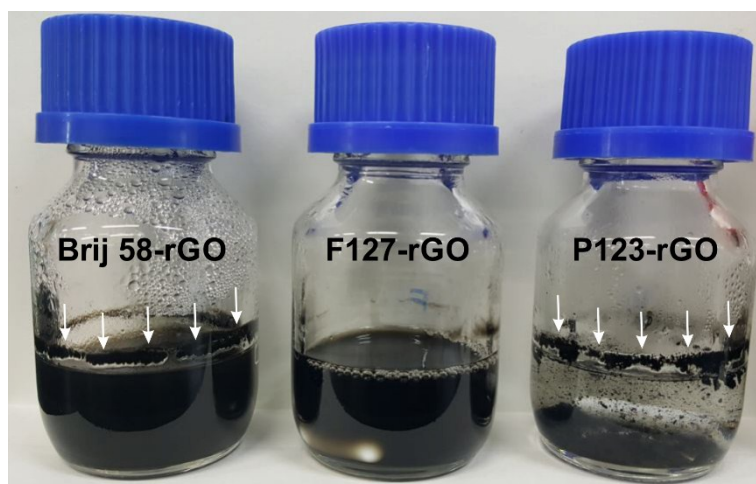


Figure S3 Photographs of reaction solutions after simultaneous reduction and modification of GO by various nonionic surfactants. The white arrows indicate the precipitates of rGO and demonstrate that Brij 58 and P123 are not good at dispersing rGO.

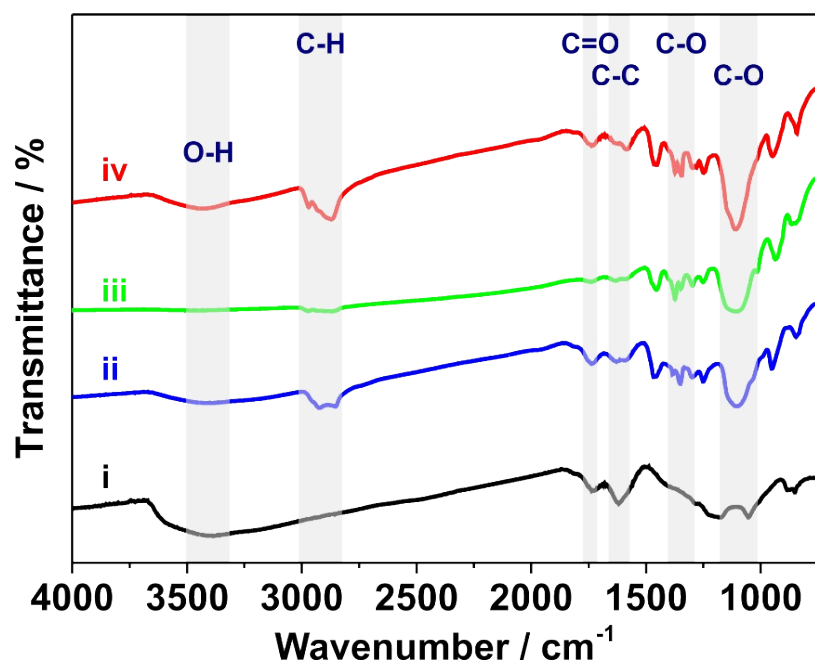


Figure S4 FT-IR spectra of (i) GO, (ii) Brij 58-modified rGO, (iii) P123-modified rGO, and (iv) F127-modified rGO (FrGO).

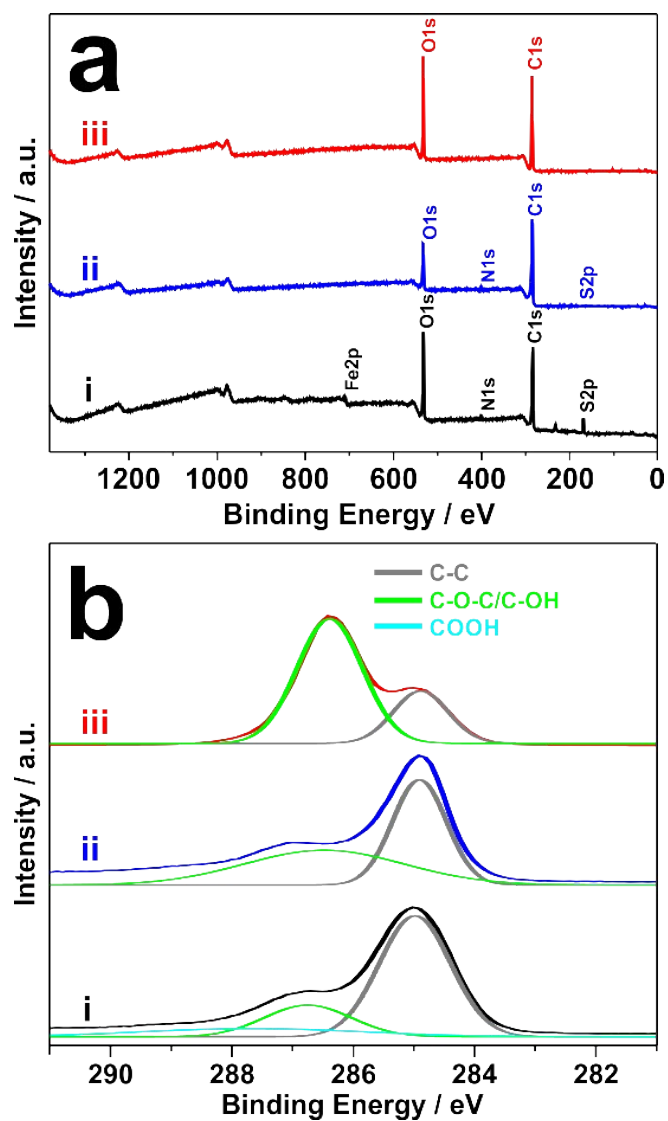


Figure S5 (a) Survey XPS spectra and (b) C 1s spectra for (i) GO, (ii) rGO and (iii) FrGO, respectively.

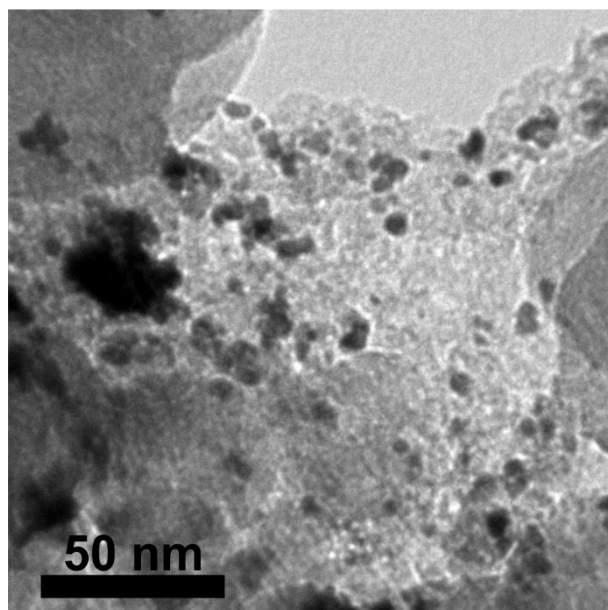


Figure S6 TEM image of commercially-available Pd/C electrocatalyst.

Table S1 Atomic ratios on GO, rGO and FrGO samples calculated using the XPS data.

Sample	C 1s	N 1s	O 1s	S 2p	Fe 2p
GO	62.00%	2.30%	30.00%	4.10%	1.60%
rGO	79.50%	1.10%	19.30%	0.10%	--
FrGO	71.70%	--	28.30%	--	--

Table S2 A comparison of the surface area and mass activity of our FrGO-Pd sample versus other graphene-supported Pd electrocatalyst materials previously reported in the literature.

Sample Name	Surface Area (m ² g ⁻¹)	Condition	Scan rate (mV s ⁻¹)	Mass Activity (mA mg ⁻¹ Pd)	Ref.
FrGO-Pd	85.69	0.5 M H ₂ SO ₄ + 0.5 M HCOOH	50	1,752.2	This work
La ₂ O ₃ promoted Pd/rGO	57.80	0.25 M H ₂ SO ₄ + 1.0 M HCOOH	50	986.42	[S1]
rGO supported Pd nanoparticles	41.8	0.5 M H ₂ SO ₄ + 0.5 M HCOOH	50	902	[S2]
Pd nanoparticles on graphitic carbon nitride-modified rGO	107.5	0.5 M H ₂ SO ₄ + 0.5 M HCOOH	50	1,610	[S3]
Pd nanoparticles on rGO-tungsten carbide composite	81.22	0.5 M H ₂ SO ₄ + 1.0 M HCOOH	20	-	[S4]
Pd/PW ₁₂ /rGO composite	-	0.5 M H ₂ SO ₄ + 1.0 M HCOOH	50	955	[S5]
Pd nanoparticles on graphene	-	0.25 M H ₂ SO ₄ + 0.25 M HCOOH	50	7	[S6]
Pd with graphene/carbon black binary carbon supports	13.24 cm ²	0.5 M H ₂ SO ₄ + 0.5 M HCOOH	10	102.14	[S7]
Graphene nanosheets support Pd nanodendrites	38.6	0.25 M H ₂ SO ₄ + 0.25 M HCOOH	50	9.86	[S8]

References

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