Electronic Supplemental Information for

Directly bonded hybrid of graphene nanoplatelets and fullerene: facile solid-state mechanochemical synthesis and application as carbon-based electrocatalyst for oxygen reduction reaction

*Jian Guan, Xiang Chen, Tao Wei, Fupin Liu, Song Wang, Qing Yang, Yalin Lu, and Shangfeng Yang**

Hefei National Laboratory for Physical Sciences at Microscale, CAS Key Laboratory of Materials for Energy Conversion, Department of Materials Science and Engineering & Synergetic Innovation Center of Quantum Information & Quantum Physics, University of Science and Technology of China (USTC), Hefei 230026, China

Contents

S1. Raman spectra of products with/without LiOH catalyst.

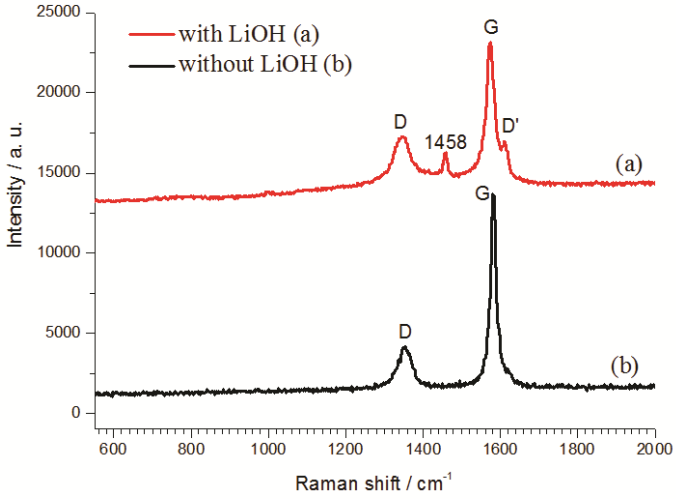


Figure S1. Raman spectra of products obtained from ball-milling of graphite and C_{60} with LiOH catalyst (graphene-C_{60} hybrid, curve a) and without LiOH catalyst (curve b).

Clearly, the characteristic Raman peak at 1458 cm^{-1} assigned to C_{60} in the Raman spectrum of the graphene-C_{60} hybrid is not observed in the Raman spectrum of the product obtained from ball-milling of graphite and C_{60} without LiOH catalyst, revealing that graphene-C_{60} hybrid did not form in this case.

S2. O1s XPS spectrum of the graphene-C_{60} hybrid.

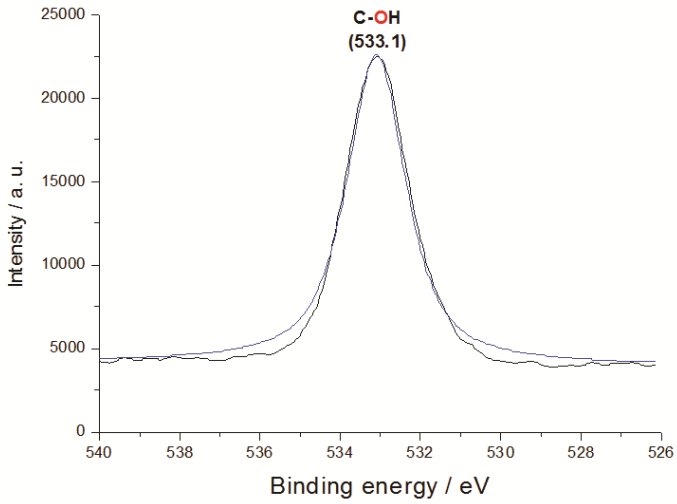


Figure S2. O1s XPS spectrum of the graphene-C_{60} hybrid.

S3. TGA curve of the graphene-C_{60} hybrid in comparison with those of pristine graphite and C_{60}.

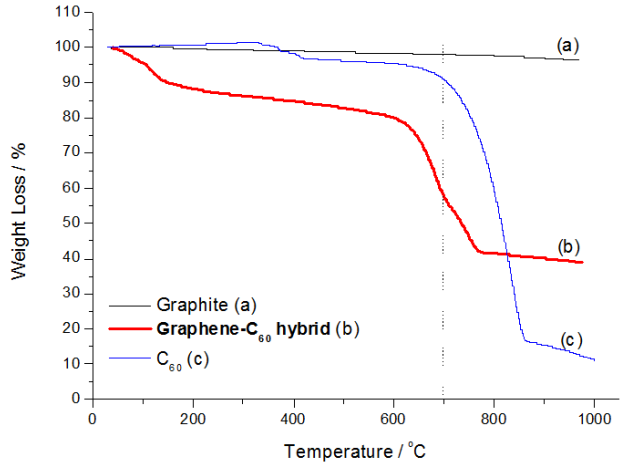
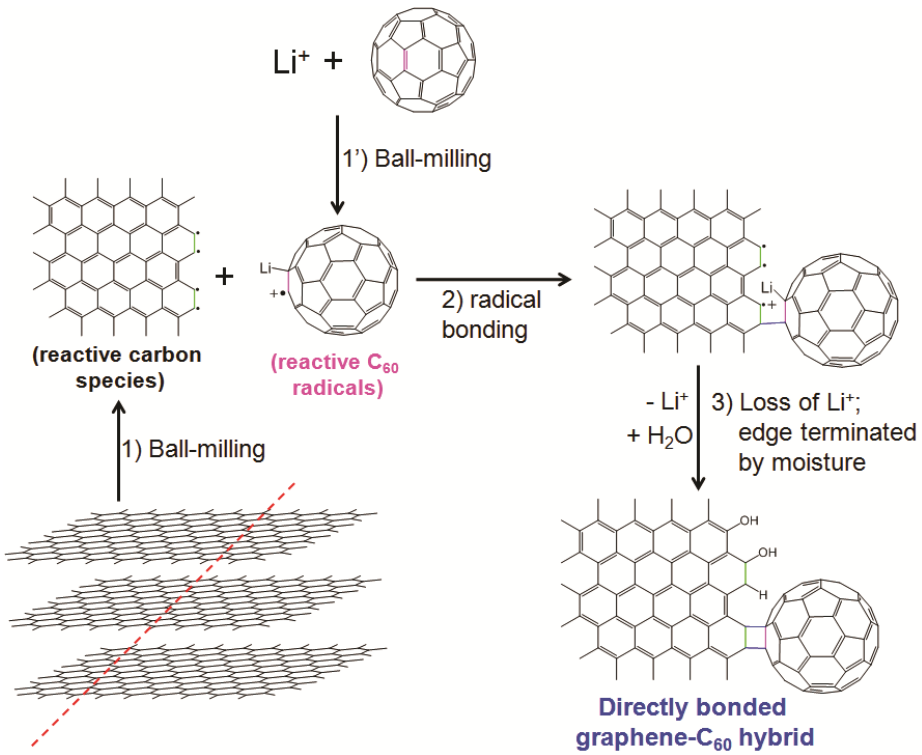


Figure S3. TGA curves of pristine graphite (a), the graphene-C_{60} hybrid (b), and C_{60} (c). A dotted vertical line was added to aid identifying the last step (700 - 770 ^{o}C) related to the decomposition of C_{60}.

S4. Schematic illustration of the formation mechanism of the graphene-C_{60} hybrid via ball-milling.



Scheme S1. Schematic illustration of the formation mechanism of the graphene-C_{60} hybrid via the mechanochemical ball-milling.

S5. Raman spectra of the products obtained with different catalysts.

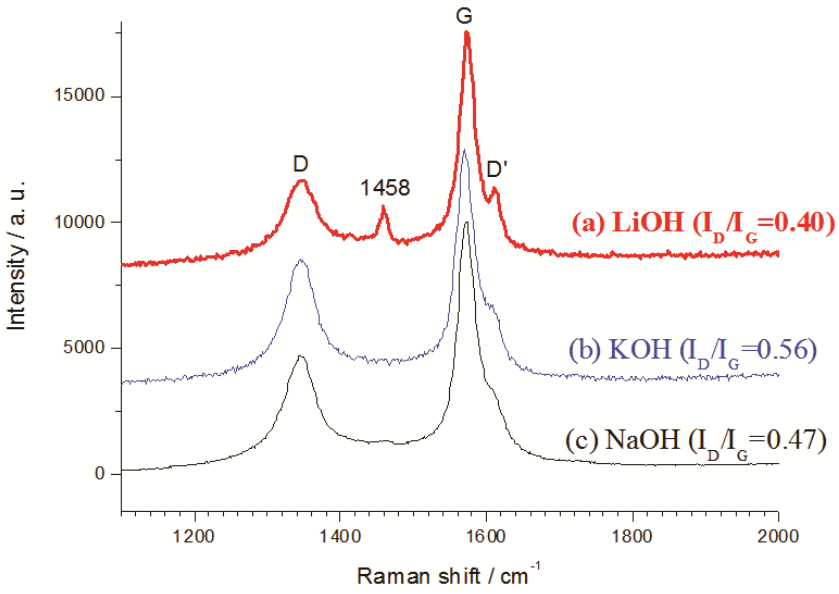


Figure S4. Raman spectra of the products obtained from ball-milling graphite and C_{60} with different catalysts of LiOH (a), KOH (b) or NaOH (c).

S6. HR-TEM images of the graphene-C_{60} hybrid taken at another site and the "blank" graphene nanoplatelets.

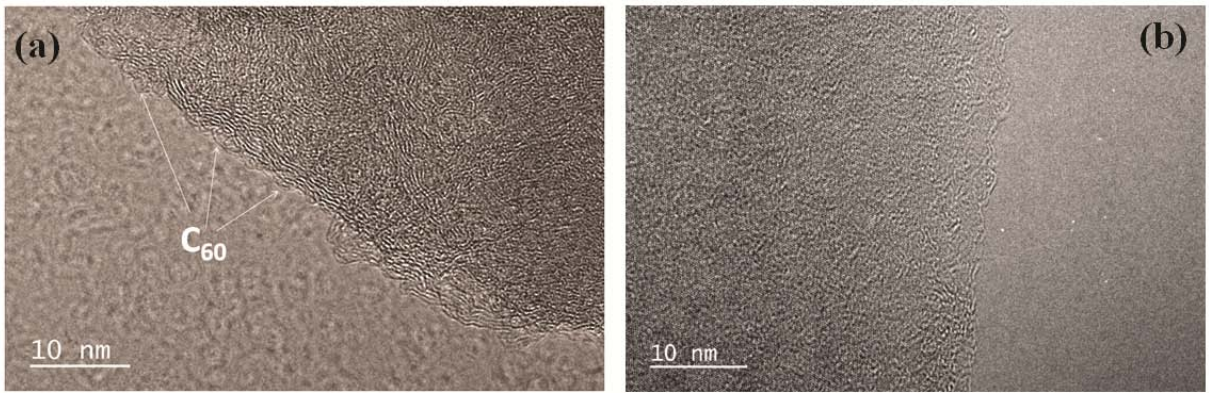


Figure S5. HR-TEM images of the graphene-C_{60} hybrid taken at another site different to that shown in Figure 5 (a) and the "blank" graphene nanoplatelets prepared by ball-milling pure graphite under identical conditions (b).