Supplementary information

Facile mass preparation and characterization of Al/copper ferrites metastable intermolecular energetic nanocomposites

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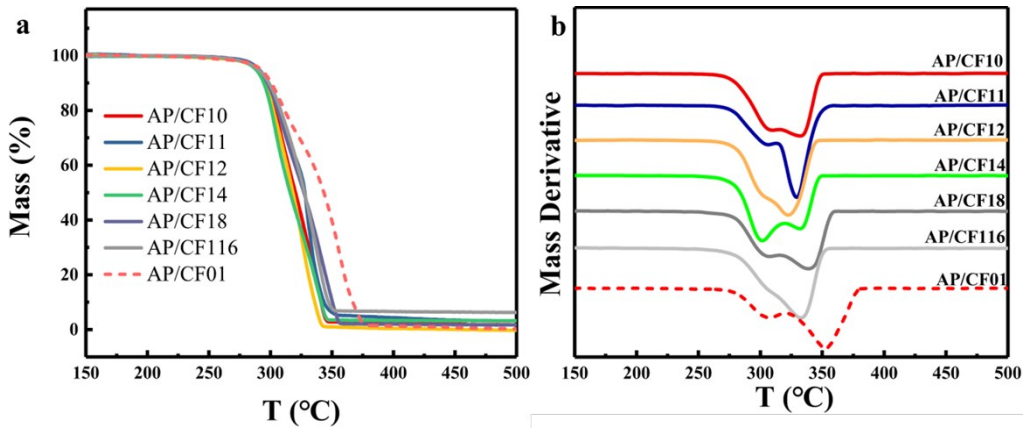


Figure S1. TG (a) and DTG (b) curves of AP/copper ferrites.

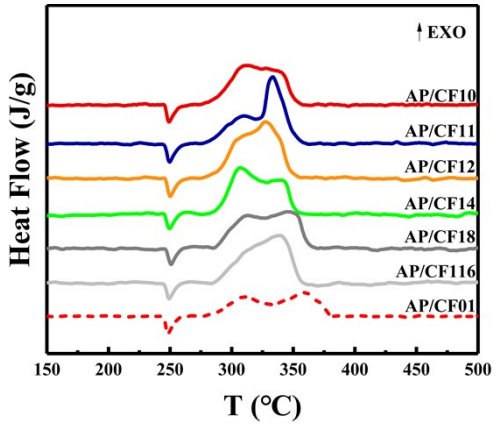


Figure S2. DSC curves of AP/copper ferrites.

CF10, CF11, CF12, CF14, CF18, CF116, CF01 respectively refer to the copper ferrites with molar ratio of Cu and Fe in the raw materials of 1:0, 1:1, 1:2, 1:4, 1:8, 1:16 and 0: 1. AP/CF** is the mixture of AP and copper ferrites. AP/CF14 shows the lowest T_{Lmax} and T_{LEXO}, and the highest weight loss ratio and heat release ratio at the LTD stage, indicating that CF14 has the highest catalytic activity for the LTD of AP. The overall catalytic activities of the copper ferrites for the LTD of AP are in the order of CF14 > CF12 > CF11 > CF18 > CF116 > CF01 > CF10. Similarly, AP/CF12 shows the highest catalytic activity for the HTD of AP with the lowest T_{Hmax} and T_{HEXO}, and the catalytic activities of the copper ferrites for the HTD of AP follow the order of CF12 > CF11 > CF14 > CF10 > CF116 > CF18 > CF01. The T_{Hmax} of AP/CF11, AP/CF14, and AP/CF10 are very

close to each other. Based on these results, it can be concluded that CF14 possess the highest catalytic activities for the thermal decomposition of AP.

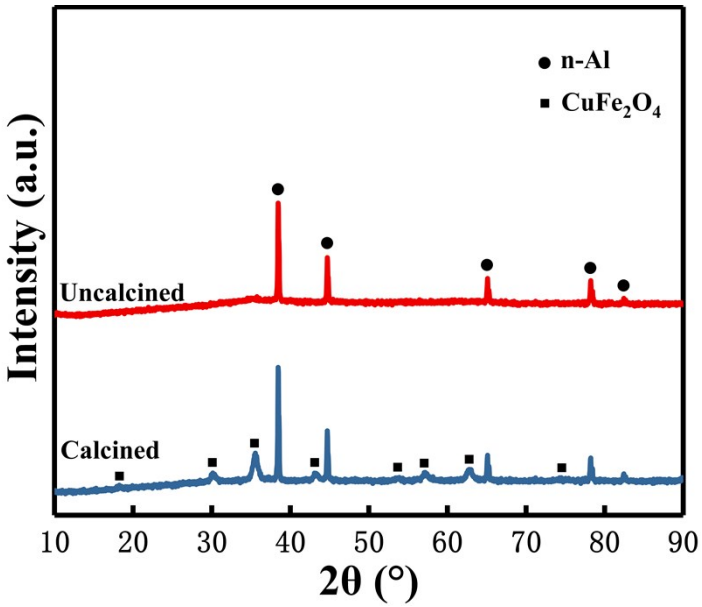


Figure S3. X-ray diffraction patterns of CFA3 before and after calcination.

It shows the crystal forms before and after calcination. Before calcination, only the diffraction peaks of Al were present. After calcination, the diffraction peaks of copper ferrites crystal form appeared but the diffraction peaks of Al did not change.

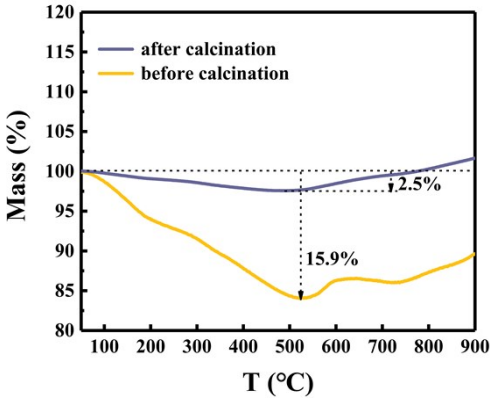


Figure S4. TG curves of CFA3 before and after calcination.

It shows the TG curves of CFA3 before and after calcination. The weight loss of the sample before calcination was as high as 15.9%, while it was only 2.5% after calcination. This shows that the impurities are basically removed after calcination, indicating that the calcination time and temperature used are feasible.

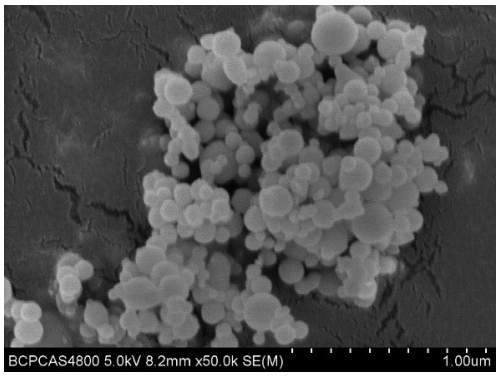


Figure S5. SEM image of pure n-Al.

It shows that n-Al is spherical, with an average particle size of about 90 nm and a wide particle size distribution. The spherical n-Al particles have a smooth surface.

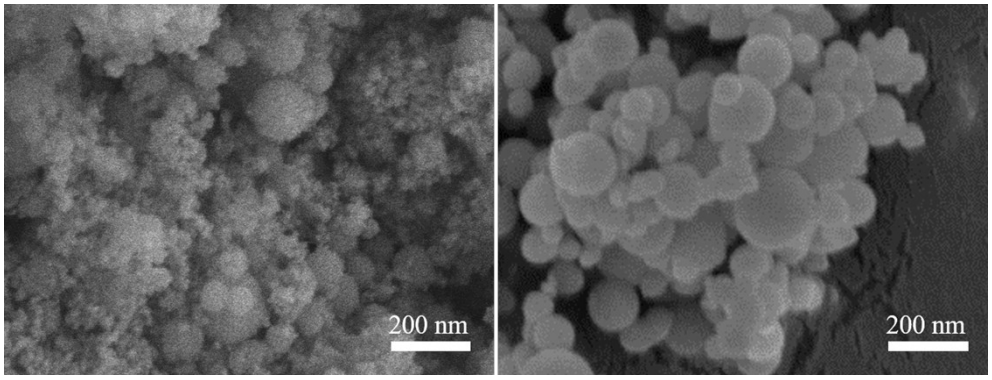


Figure S6. Partially enlarged comparison image of Al/copper ferrites (CFA7, left) and n-Al (right).

By comparison, it can be found that the n-Al surface in CFA7 is rougher than that of pure n-Al, which indicates that copper ferrites exist on the n-Al surface.

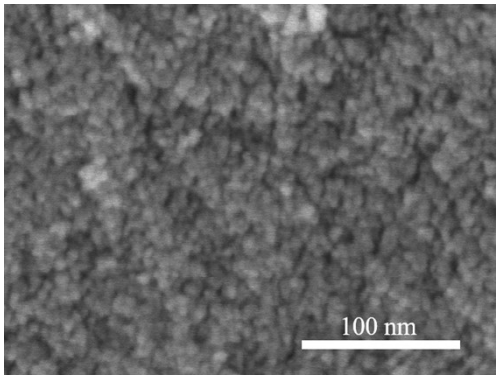
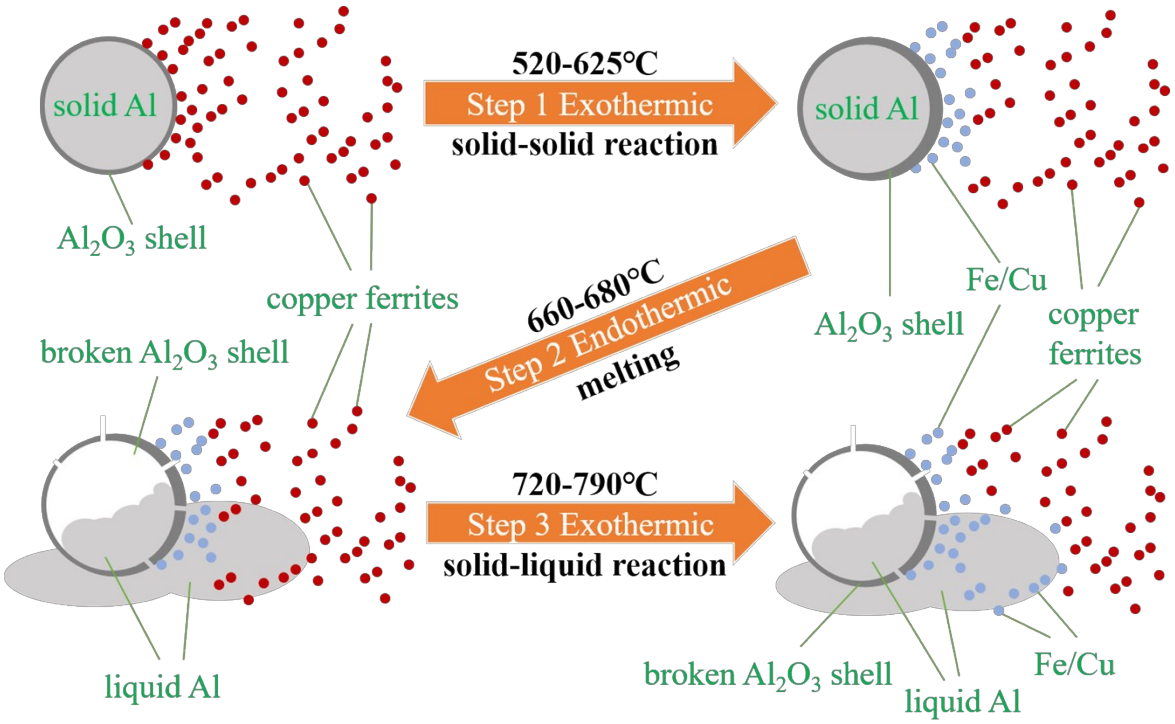


Figure S7. SEM image of copper ferrites particles (CF14).

It can be found that the bulk CF is composed of nano-sized particles.



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57 **Figure S8. Schematic diagram of the thermite reaction process.**

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60 **Table S1. Specific surface area data of CuO, Fe_2O_3 and copper ferrites**

Sample	CuO (CF10)	copper ferrites (CF14)	Fe_2O_3 (CF01)
S_{BET} (cm^2/g)	2.88	60.22	87.92

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