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## **Supporting Information**

- Fig. S1 The HAADF-STEM images and corresponding EDX elemental mapping images of the catalysts (a) MoAl(F) (b) MoAl(C)
- Fig. S2 The NH<sub>3</sub>-TPD profile of the catalysts
- Fig. S3 The PXRD patterns of the spent catalysts

**Fig. S4** The (a)  $N_2$  adsorption-desorption isotherms (Adsorption points are marked by filled symbols and desorption points by empty symbols) and (b) pore size distributions of the spent catalysts

Fig. S5 The TG-DSC curves of the spent catalysts



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