Supporting Information

Copper Manganese Oxide Enhanced Nanoarray-Based Monolithic Catalysts for Hydrocarbon Oxidation

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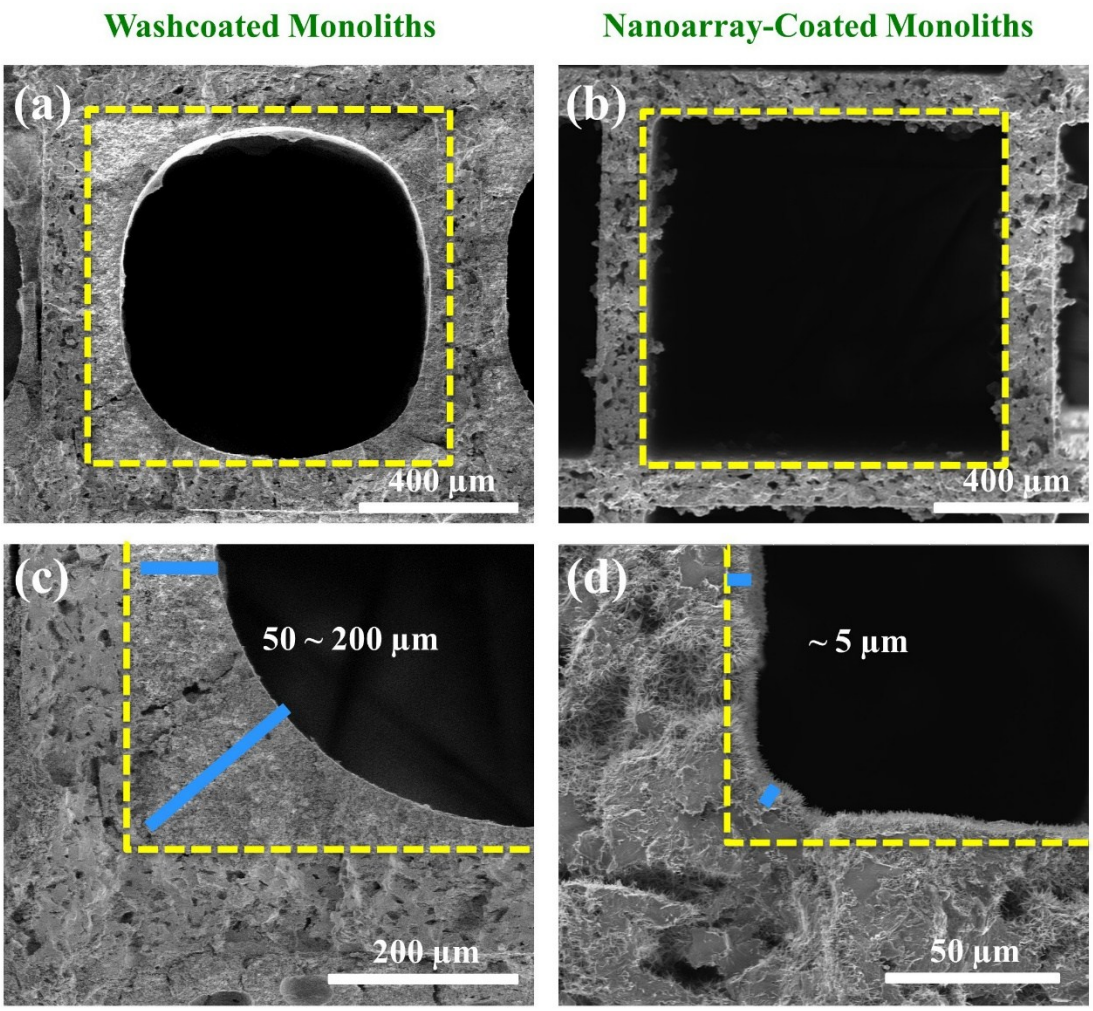

Fig. S1. Cross-section SEM images of monolithic catalysts, (a) WC-$CuMn_2O_4$, (b) NA-$Co_{0.53}Cu_{0.47}Mn_2O_4$, (c) channel corner of WC-$CuMn_2O_4$, and (d) channel corner of NA-$Co_{0.53}Cu_{0.47}Mn_2O_4$.

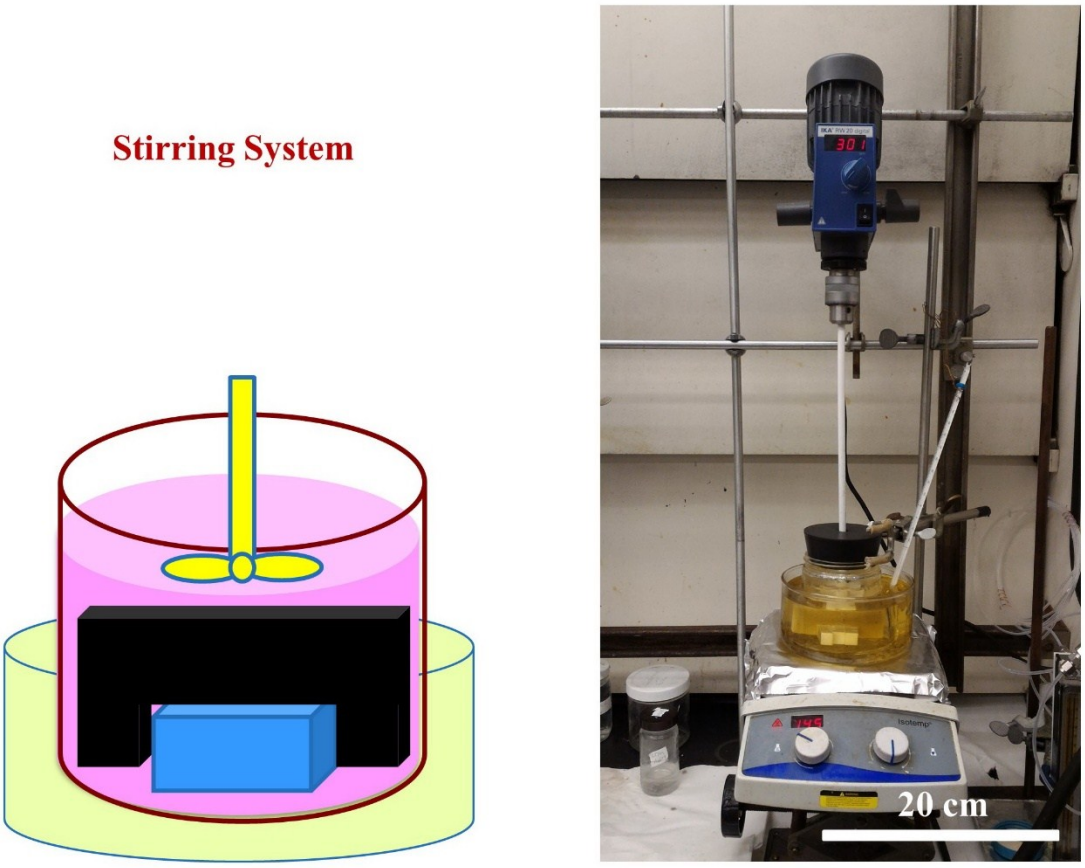

Fig. S2. Schematic diagram and photo of the synthetic setup for the nanoarray-based monolithic catalysts using the mechanical stirring system.

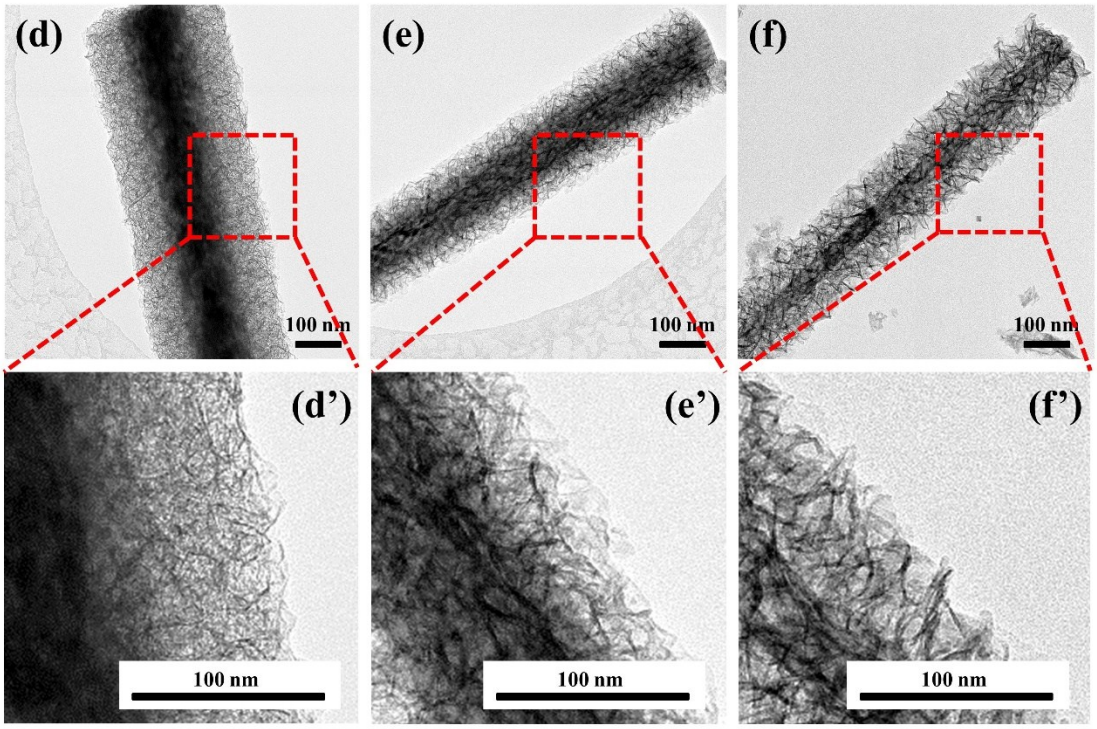

Fig. S3. TEM images of manganese oxide nanorods with $CuMn_2O_4$ nanosheets for (a) NA-$CuMn_2O_4$, (b) NA-$Co_{0.36}Cu_{0.64}Mn_2O_4$, and (c) NA-$Co_{0.53}Cu_{0.47}Mn_2O_4$, and the zoom-in images, (d)-(f), respectively.

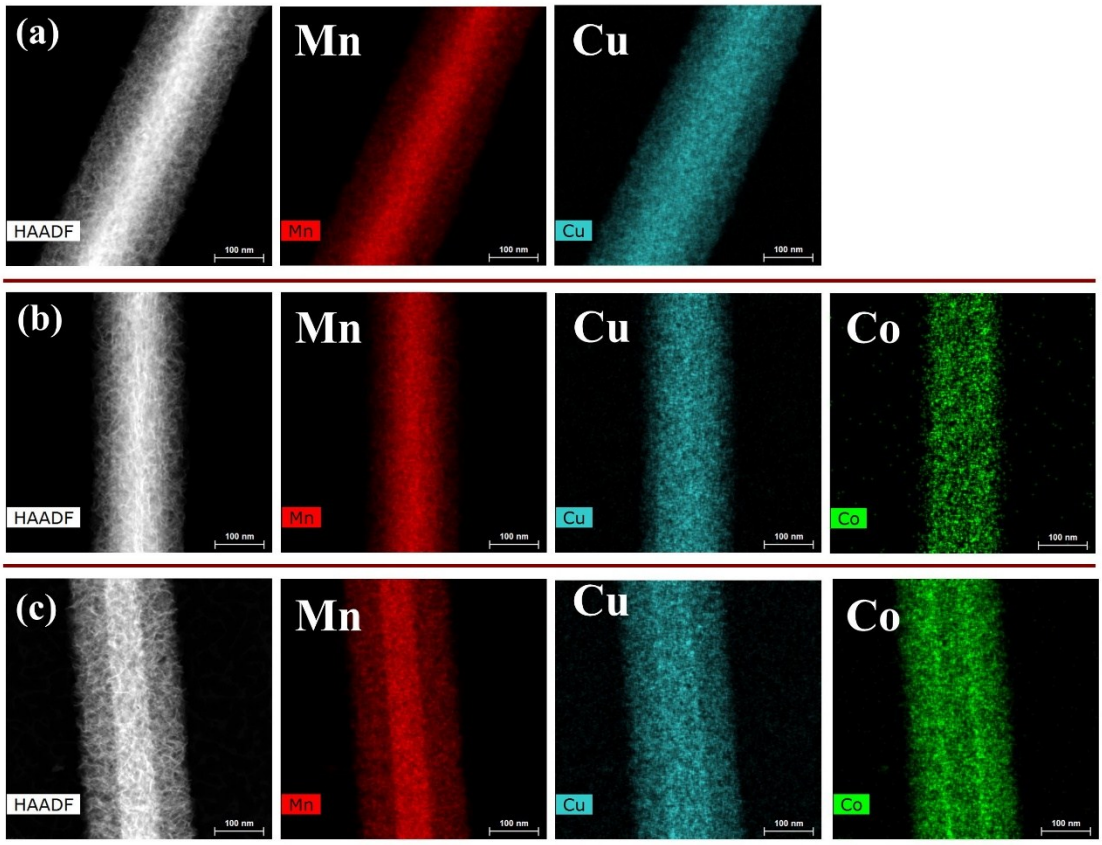

Fig. S4. HAADF images and elemental mapping of Mn, Cu, and Co distribution for $CuMn_2O_4$ coated MnO_2 nanorods. Row (a) NA-$CuMn_2O_4$, (b) NA-$Co_{0.36}Cu_{0.64}Mn_2O_4$, and (c) NA-$Co_{0.53}Cu_{0.47}Mn_2O_4$, respectively.

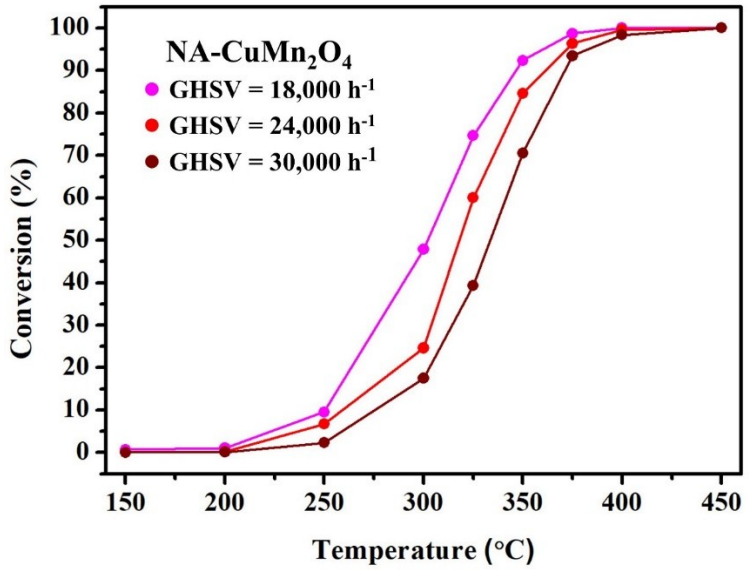

Fig. S5. C_3H_8 conversion of nanoarray-based catalysts, NA-$CuMn_2O_4$, with different gas hourly space velocity (GHSV), 18,000, 24,000, and 30,000 h^{-1}.

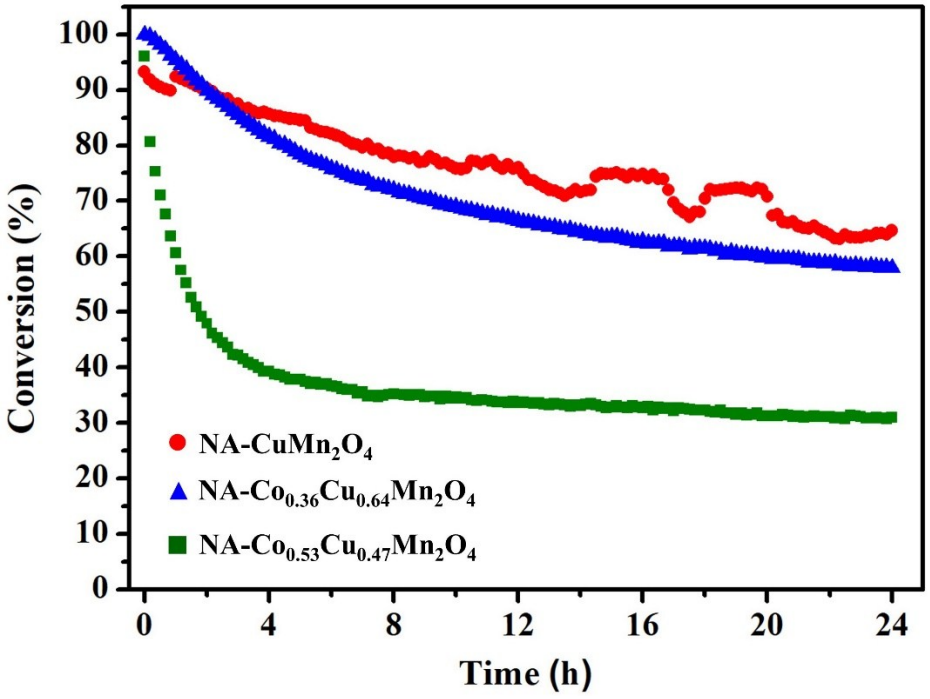

Fig. S6. C_3H_8 conversion of the three nanoarray-based catalysts at 375 °C and GHSV of 24,000 h^{-1}.