Supporting Information

Highly dispersed Ga_2O_3 integrated mesoporous γ-Al_2O_3 nanocomposites ($Al_{10}Ga_xO_y$) for enhanced hydrogen production by dimethyl ether steam reforming reaction

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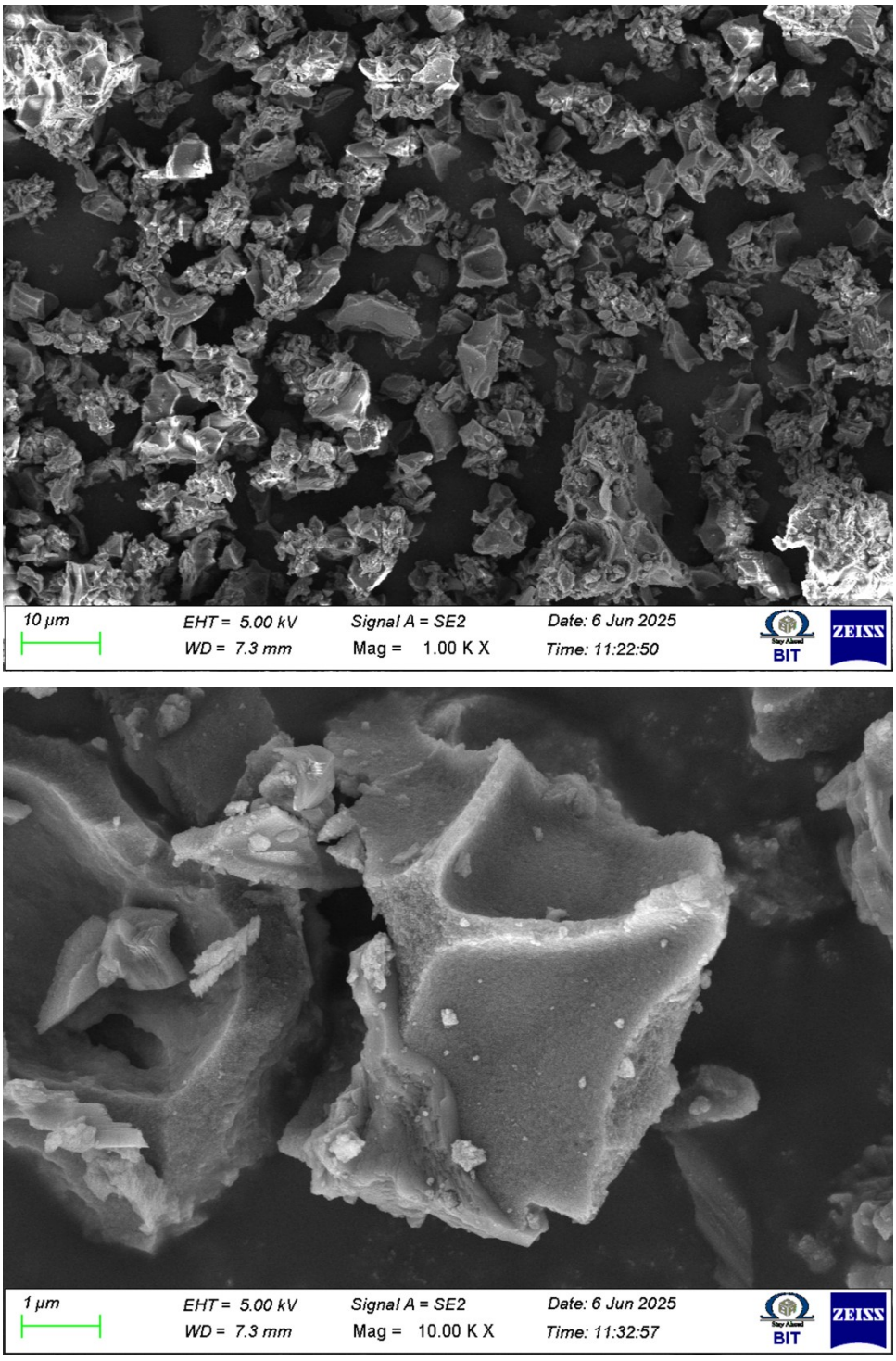

Figure S1. FE SEM images of mesoporous $Al_{10}Ga_1$

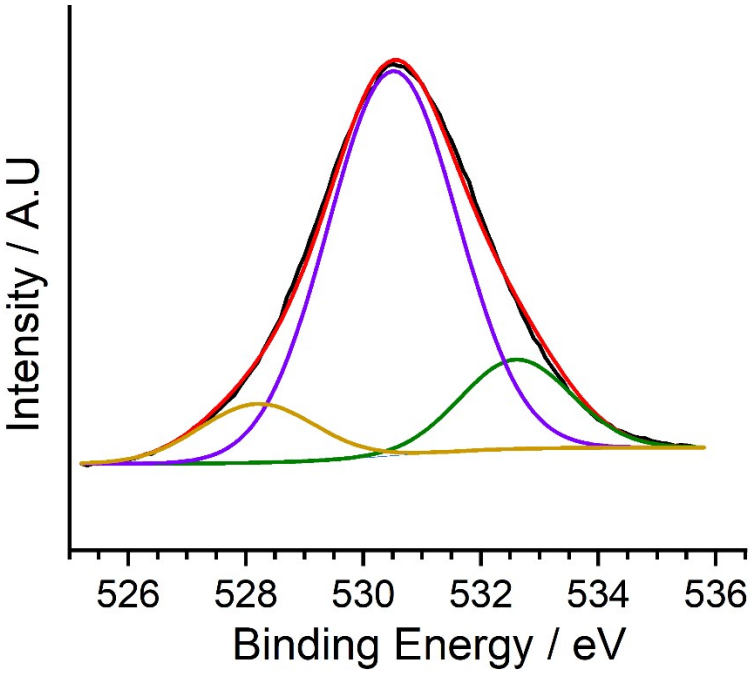

Figure S2. The deconvoluted O 1s core level XPS of mesoporous $Al_{10}Ga_1$.

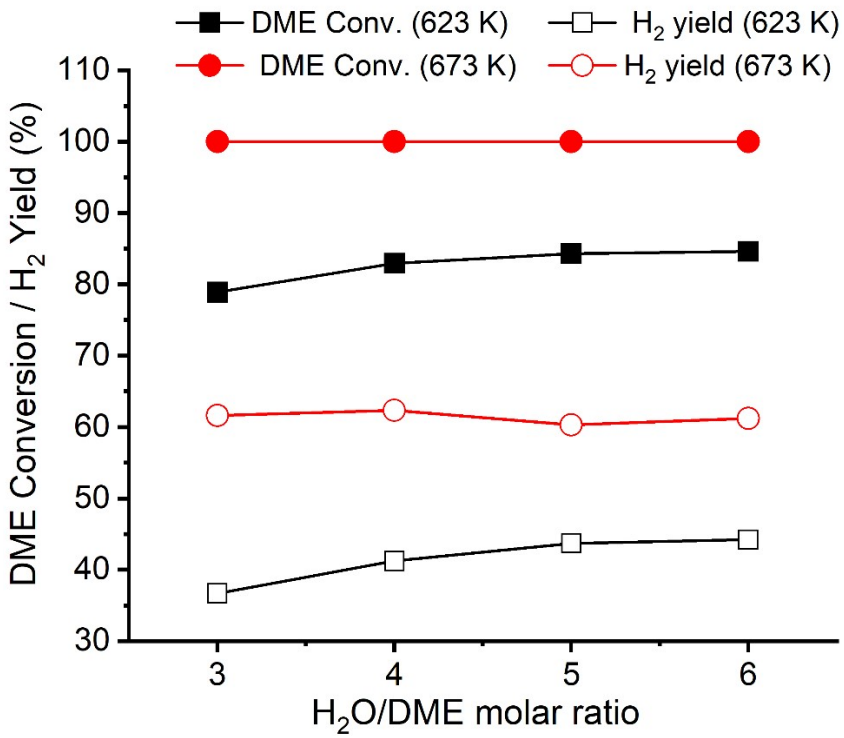

Figure S3. The effect of H_2O/DME molar ratio on DME conversion and H_2 yield on mesoporous $Al_{10}Ga_2$ at 623-673 K.

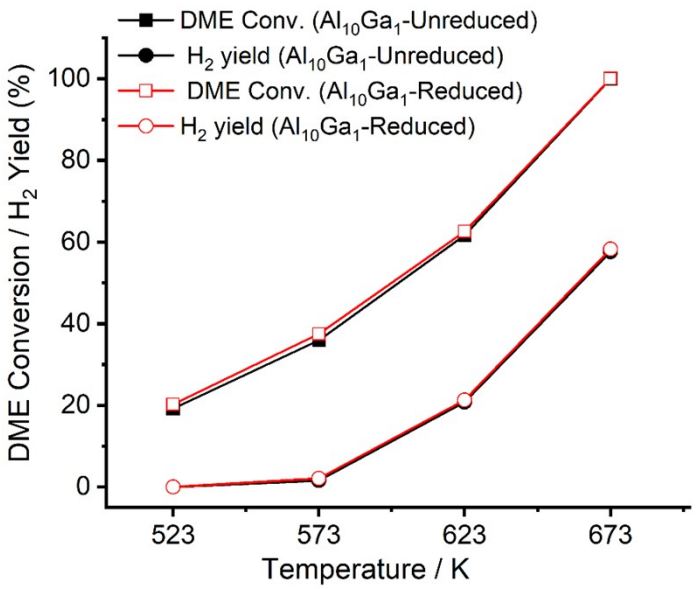

Figure S4. A comparison of the DME SR activity of mesoporous Al_9Ga_1 catalyst with and without pre-reduction treatment. Pre-reduction treatment of $Al_{10}Ga_1$ was carried out with 10% H_2 at 623 K for 30 minutes.

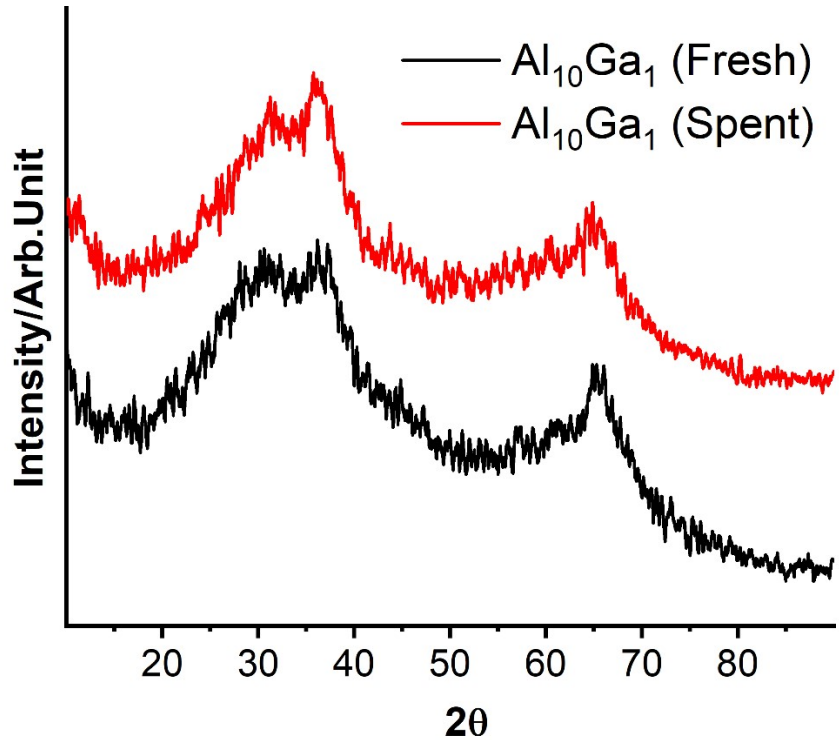

Figure S5. A comparison of the fresh and spent mesoporous Al_9Ga_1 catalyst. Spent Al_9Ga_1 catalyst was obtained after time-on-stream (TOS) study for 12 h at 673 K.

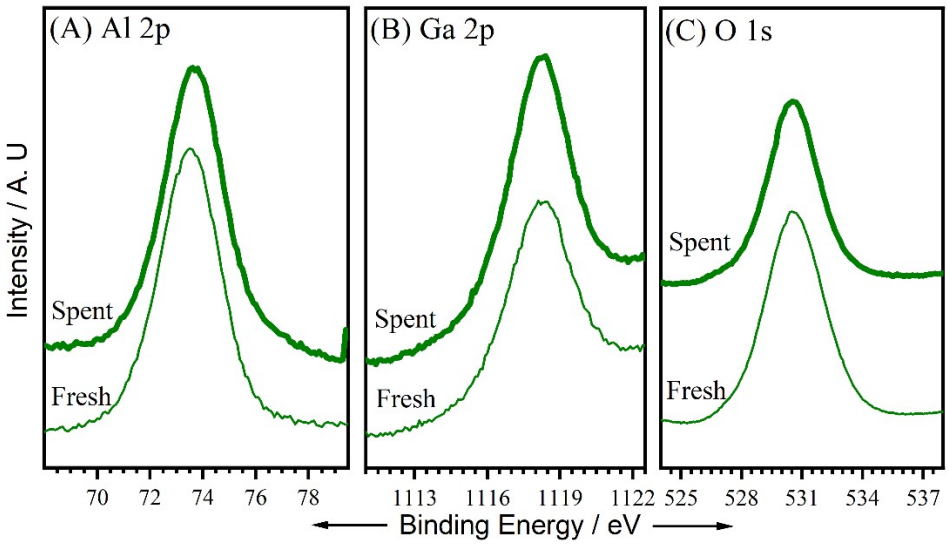

Figure S6. XPS spectra of (A) Al 2p, (B) Ga 2p, and (C) O 1s core levels from fresh and spent $Al_{10}Ga_1$ catalysts. Spent Al_9Ga_1 catalyst was obtained after TOS study for 12 h at 673 K.

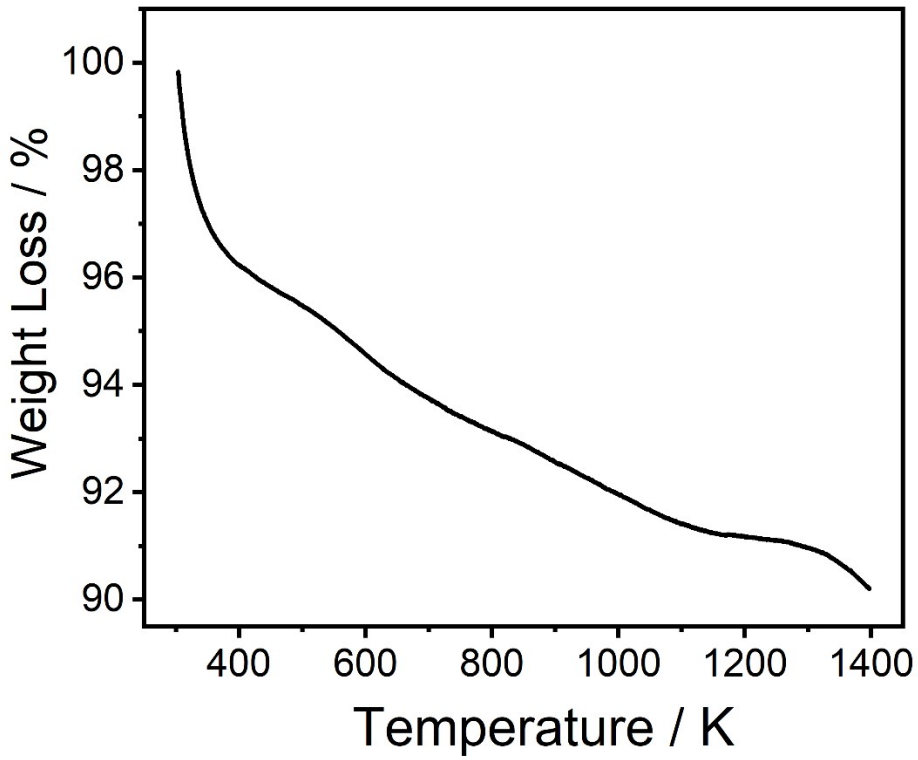

Figure S7. The thermogravimetric (TG) analysis of the spent $Al_{10}Ga_1$ catalyst obtained after TOS study for 12 h at 673 K.

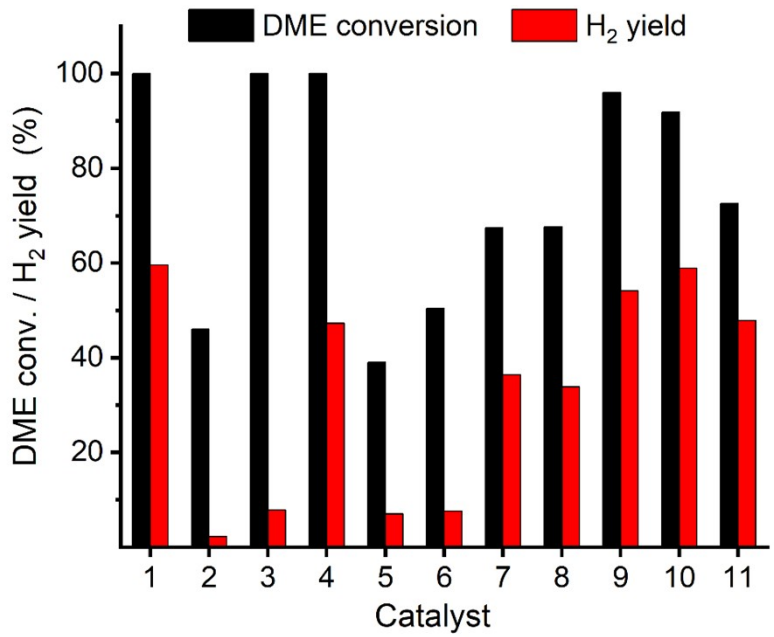

Figure S8. A comparison of the DME SR activity of mesoporous Al_9Ga_1 catalyst with mesoporous Al_9M_1 (where M = Ti to Zn) and non-mesoporous Al_9Ga_1 oxide catalysts at 673 K. The catalyst labels are 1. mesoporous Al_9Ga_1, 2 to 10 are mesoporous Al_9M_1 catalysts (2. Al_9Ti_1, 3. Al_9V_1, 4. Al_9Cr_1, 5. Al_9Mn_1, 6. Al_9Fe_1, 7. Al_9Co_1, 8. Al_9Ni_1, 9. Al_9Cu_1, and 10. Al_9Zn_1), and 11. non-mesoporous Al_9Ga_1.

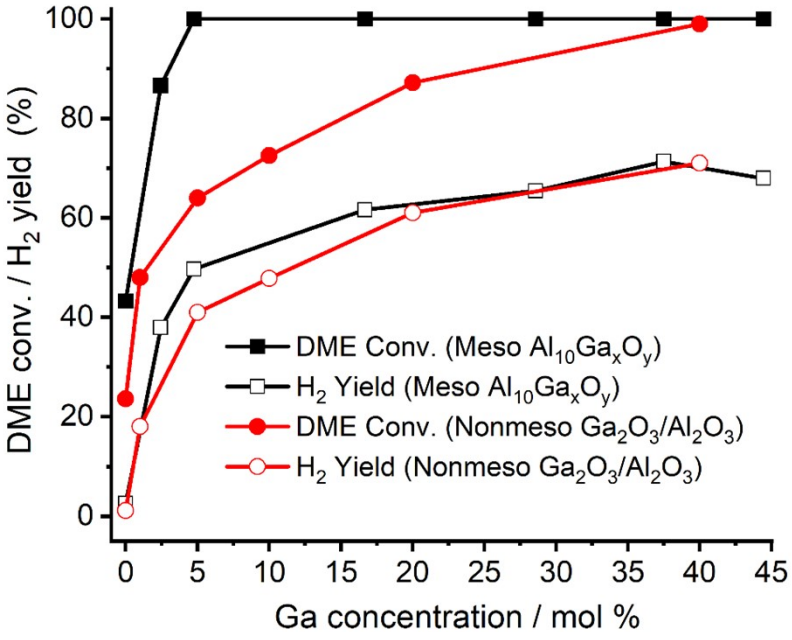

Figure S9. A comparison of the DME SR activity of mesoporous $Al_{10}Ga_xO_y$ catalysts in this study and non-mesoporous Ga_2O_3/Al_2O_3 mixed oxides reported in the literature (Ref. 17 in the main text).