Supporting Material:

Tracking Site-Specific C−C Coupling of Formaldehyde Molecules on Rutile TiO_2(110)

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S1 Additional figure illustrating the formation of diolate

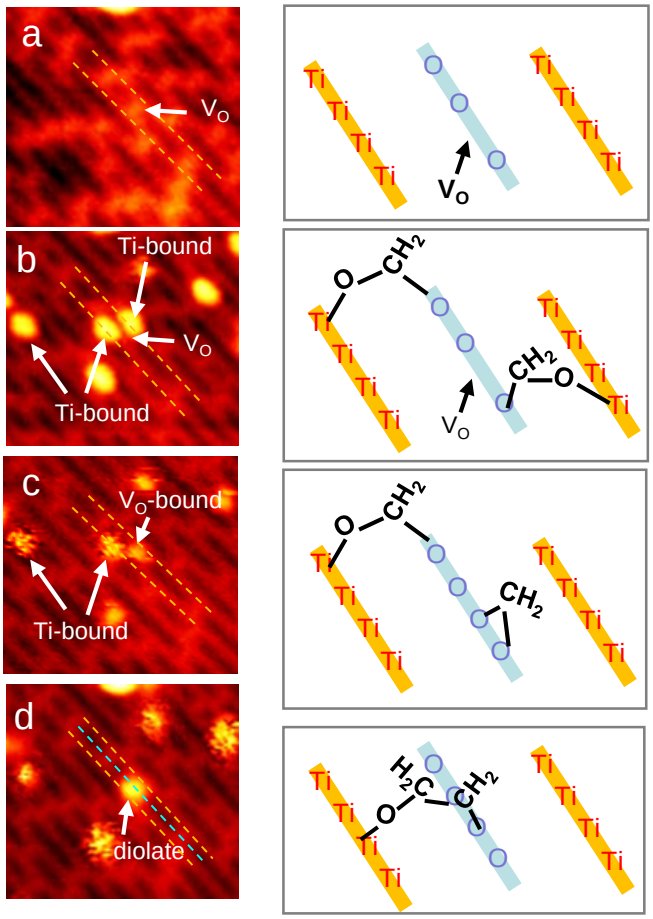

Figure S1. STM images obtained from the same area of reduced TiO_2 (110) at different temperatures, illustrating the formation of diolate via coupling of the Ti-bound formaldehyde and the V_O-bound formaldehyde: (a) clean surface imaged at 75 K, (b) surface imaged at 75 K after dosing 0.02 ML formaldehyde at 75 K (V_b = 1.3 V), (c) imaged at 145 K (V_b = 1.5 V) after subsequently increasing the temperature of b to 145 K, and (d) imaged at 170 K (V_b = 1.3 V). Dotted lines mark the position of Ti rows (orange) and O_b row (blue).

S2 The STM images showing the initial and the final status of sequence A.

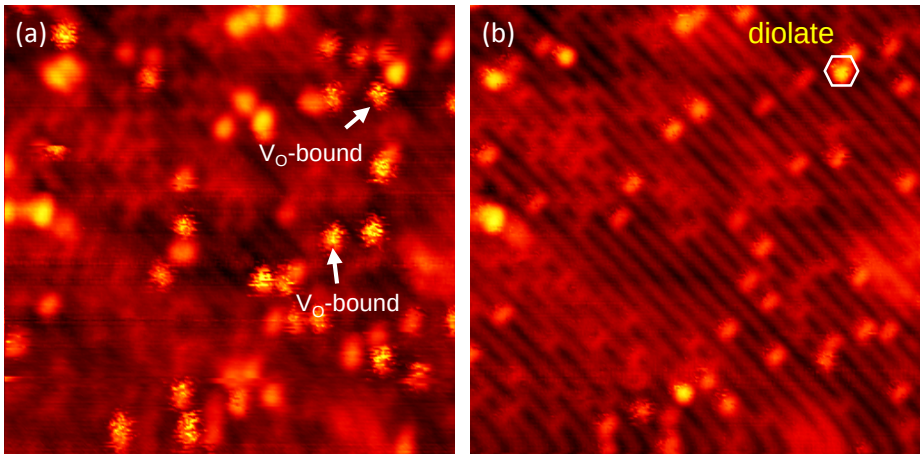

Figure S2. The isothermal STM images showing (a) the initial and (b) the final status of sequence A taken at 190 K.

S3 The images showing the initial and the final status of sequence B.

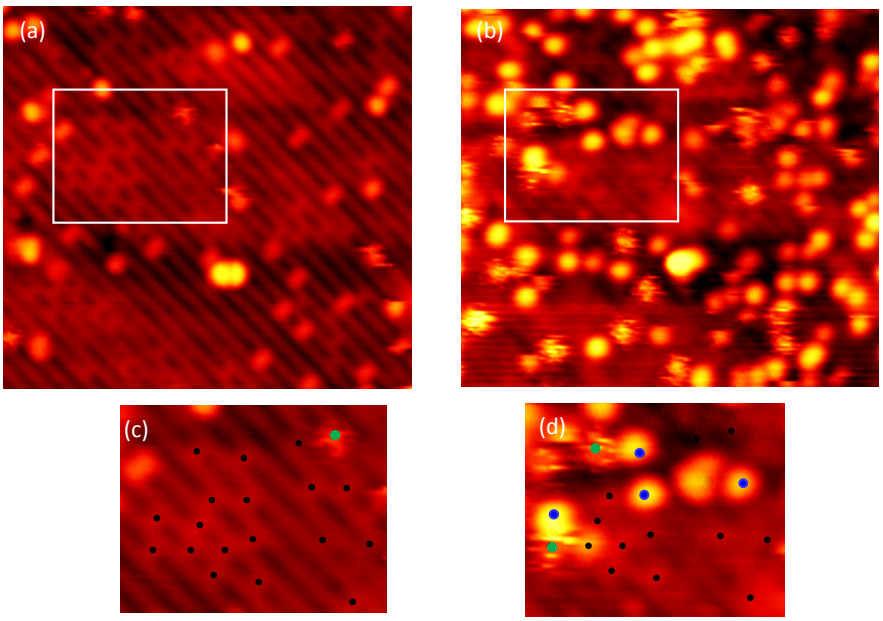

Figure S3. The isothermal STM images showing (a) the initial and (b) the final status of sequence B taken at 190 K. (c) and (d): Magnified areas marked in (a) and (b). Black dots mark the position of V_O's. Blue dots and green dots mark the position of diolates and V_O-bound CH_2O molecules.

S4 Another set of statistical analysis performed on the images of a surface at 180 K with less V_O-concentration (0.075 ML) to compliment Figure 3A.