

Supporting Information

Sol–Gel–Derived 2D Nanostructures of Aluminum–Hydroxide Acetate:
Toward the Understanding of the Reaction Mechanism and
Nanostructure Formation

Ruohong Sui, John Lo, Christopher B. Lavery, Connor E. Deering, Nancy Chou, and Robert A. Marriott*

Chemistry Department, University of Calgary, 2500 University Drive, Northwest, Calgary,
Alberta, Canada, T2L 4N1

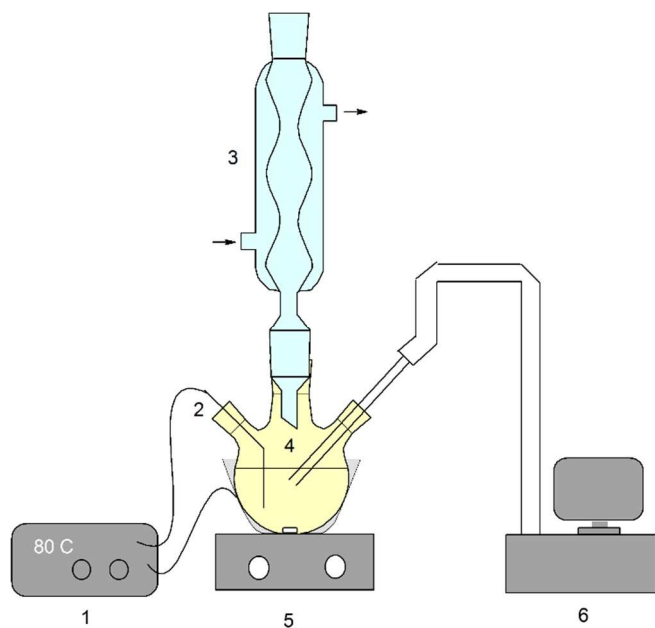


Figure S1. Schematic experimental setup. 1. A temperature controller; 2. A thermal couple; 3. A reflux condenser; 4. A three-neck round-bottom flask; 5. A magnetic stirrer; 6. An ATR-FTIR system for in-situ infrared analysis.

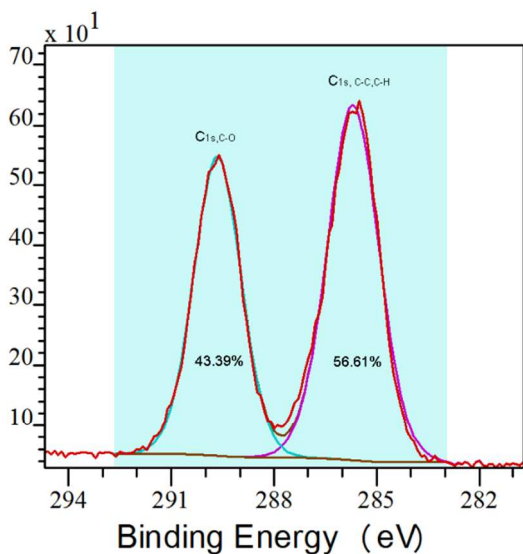


Figure S2. High resolution XPS spectrum, C_{1s} of the sample prepared at 323 K. The formula of the sample can be written as Al(OH)_x(OAc)_{3-x}, where x is the molar fraction of Al(OH)(OAc)₂. In this formula, C_{1s},C-O = C_{1s},C-H; therefore, the extra C_{1s},C-H was contributed by the adsorbed hydrocarbon which was calculated as 56.61% - 43.39% = 13.22%. Hence, 100 - 13.22 = 86.78% of the measured total carbon was used as the carbon concentration.

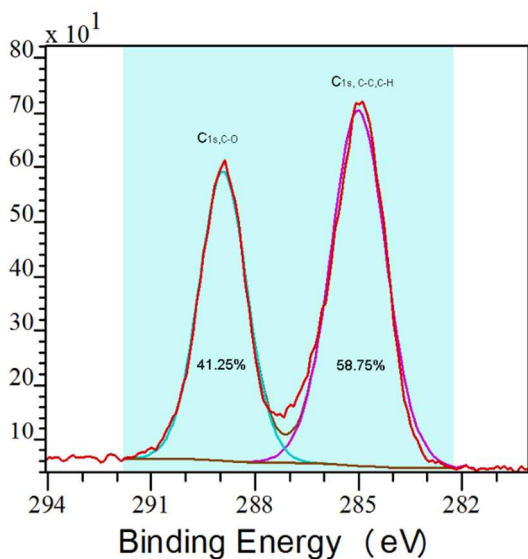


Figure S3. High resolution XPS spectrum, C_{1s} of the sample prepared at 353 K. The formula of the sample can be written as Al(OH)(OAc)₂. In this formula, C_{1s,C-O} = C_{1s,C-H}; therefore, the extra C_{1s,C-H} was contributed by the adsorbed hydrocarbon which was calculated as 58.75% - 41.25% = 17.50%. Hence, 100 - 17.50 = 82.50% of the measured total carbon was used as the carbon concentration.

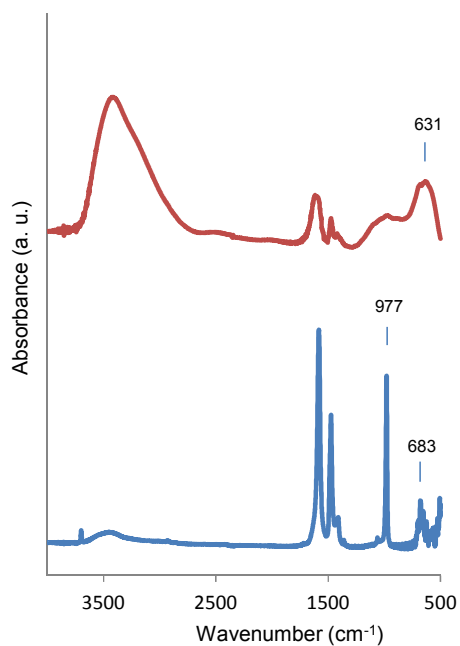


Figure S4. The FTIR spectra of the deuterium substituted (red) and the original nanoribbons (blue) prepared at 353 K.

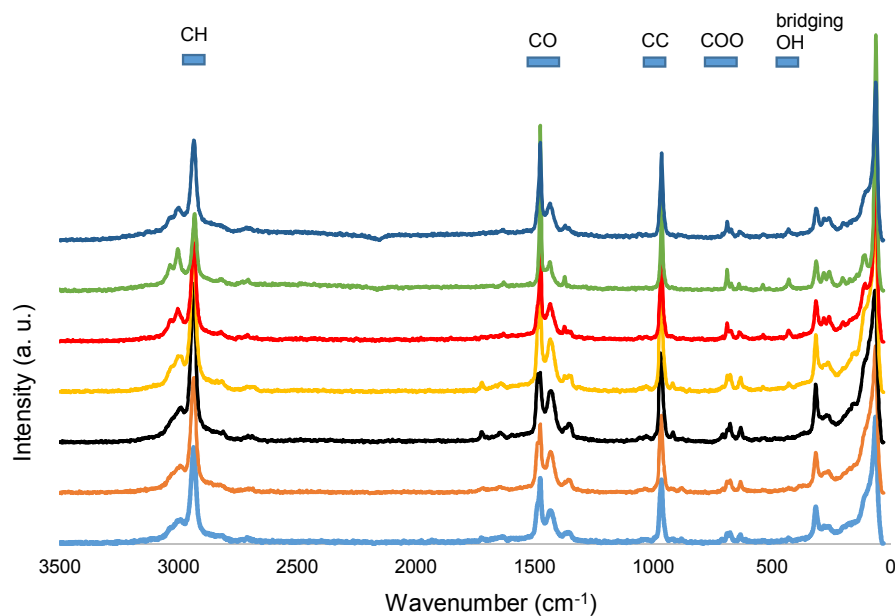


Figure S5. The Raman spectra and peak assignments of the samples prepared at 30 (baby blue), 40 (orange), 50 (black), 60 (yellow), 70 (red), 80 (green) and 90 °C (blue).

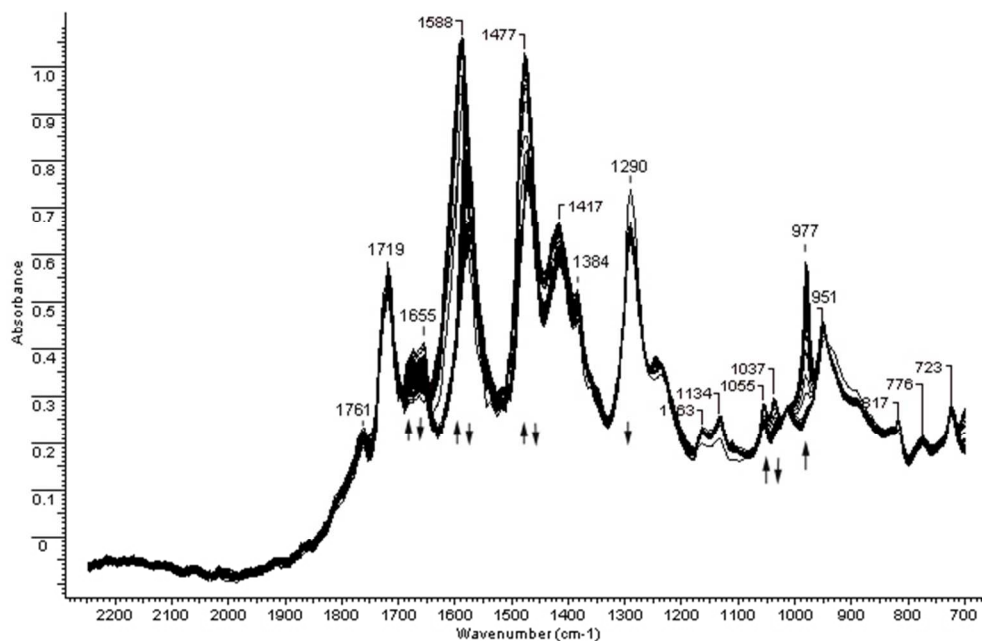


Figure S6. The in situ FTIR spectra obtained at the reaction temperature of 333 K: expanded region highlights the ν_{COO} - and C-C bands as a function of time (arrows indicate progressive trends of absorbance with time).

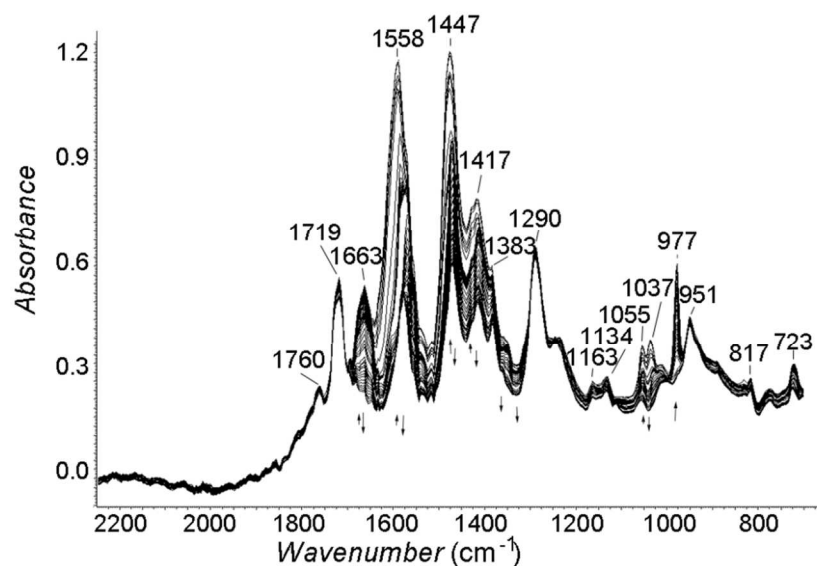


Figure S7. The in situ FTIR spectra obtained at reaction temperature of 343 K: expanded region highlights the $\nu_{\text{coo-}}$ and C-C bands as a function of time (arrows indicate progressive trends of absorbance with time).

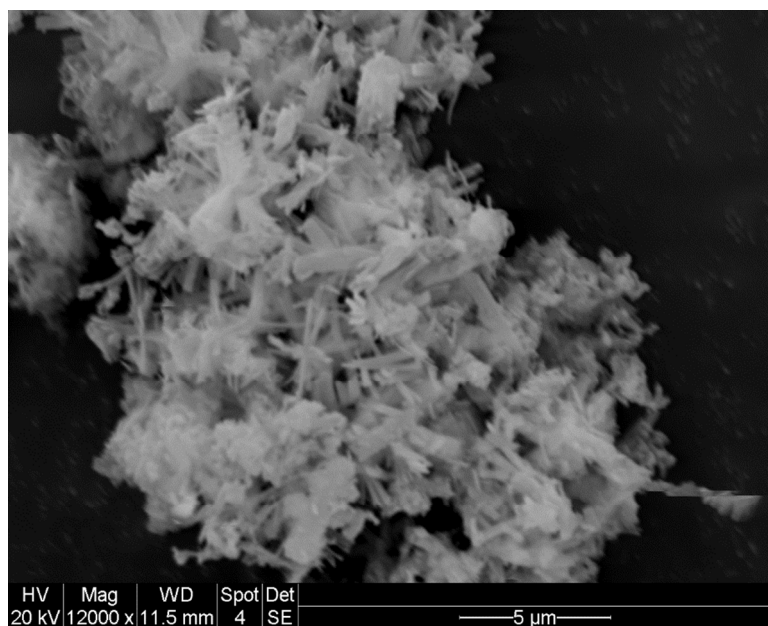


Figure S8. SEM image of the Al_2O_3 obtained after calcination of $\text{Al}(\text{OH})(\text{OAc})_2$ at 873 K for two hours.

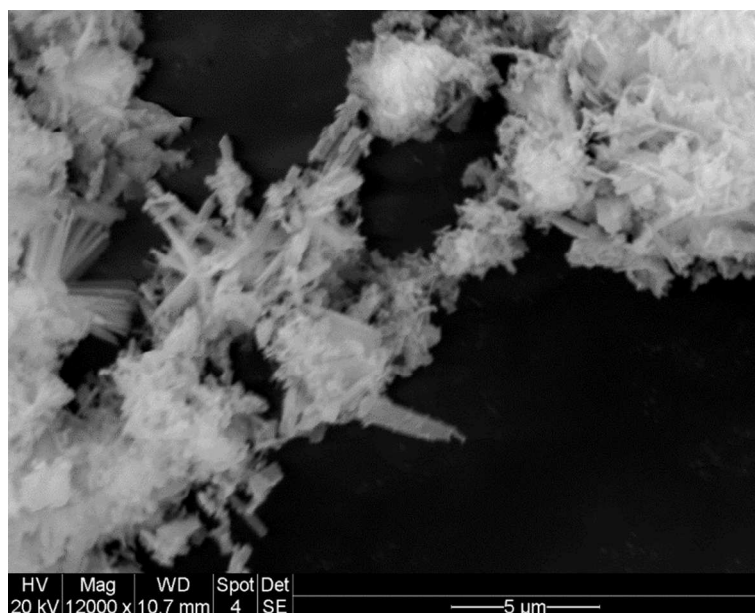


Figure S9. SEM image of the Al_2O_3 obtained after calcination of $\text{Al}(\text{OH})(\text{OAc})_2$ at 1073 K for two hours.

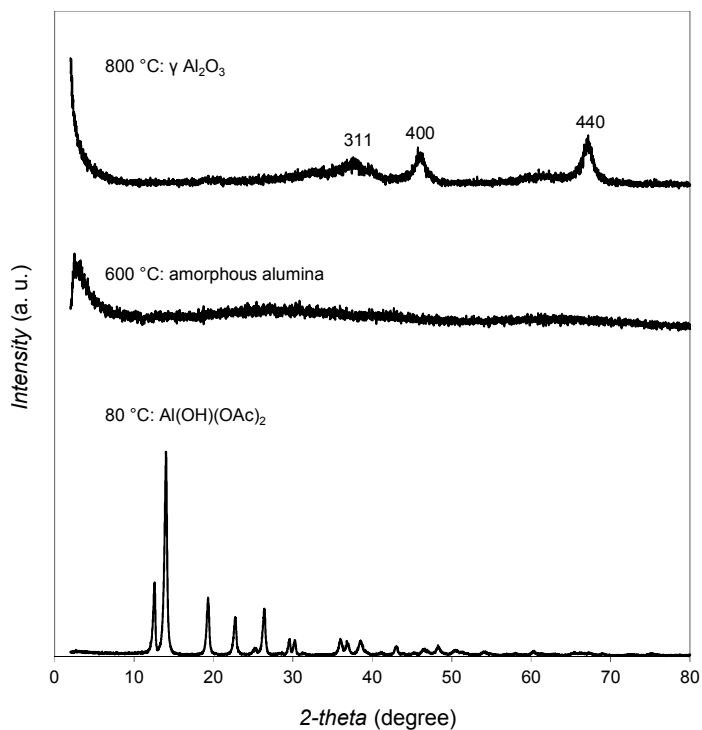


Figure S10. The XRD patterns of the as-prepared nanoribbons, in addition to those exposed to calcination temperatures of 873 K and 1073 K.