

Reactivity of Vanadium Oxytrichloride with β -diketones and Diesters as precursors for Vanadium Nitride and Carbide- Supporting Information

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Complex 1 = Dichloro(oxo)(2,4-Pentanedione)

Complex 2 = Synthesis of Dichloro(oxo)(diethyl malonate)

Complex 3 = Dichloro(oxo)(diethyl succinate)

Additional TEM images:

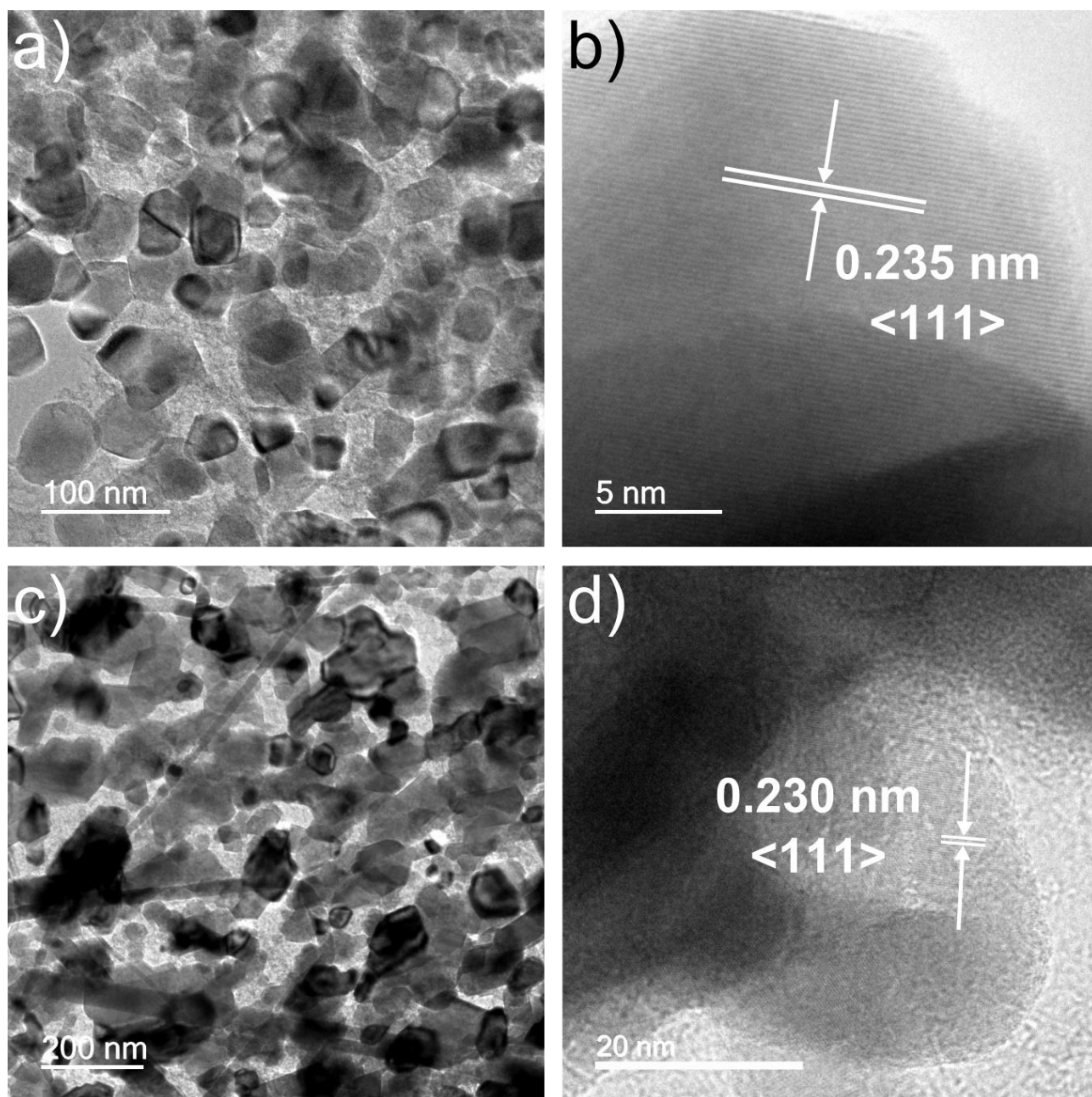


Figure S1: TEM images of VN: a) Sample derived from complex 1 with b) showing a d -spacing of 0.235 nm, assigned as the $\langle 111 \rangle$ plane of VN, c) Sample derived from complex 3 with b) showing a d -spacing of 0.230 nm, also assigned as the $\langle 111 \rangle$ plane of VN.

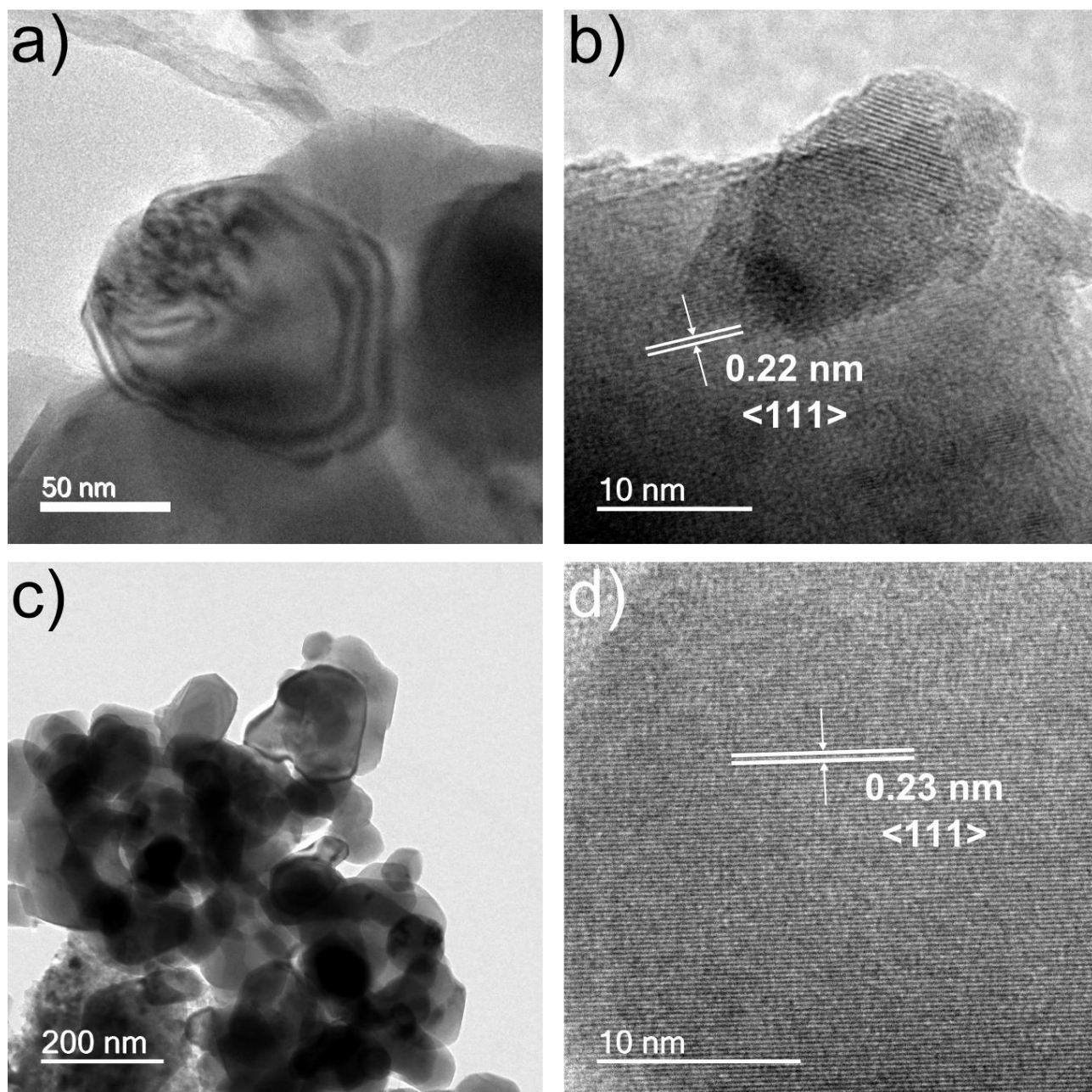


Figure S2: TEM images of VC: a) Sample derived from complex 1 with b) showing a d -spacing of 0.22 nm, assigned as the $\langle 111 \rangle$ plane of VC, c) Sample derived from complex 3 with b) showing a d -spacing of 0.23 nm, also assigned as the $\langle 111 \rangle$ plane of VC.

Additional EDS data:

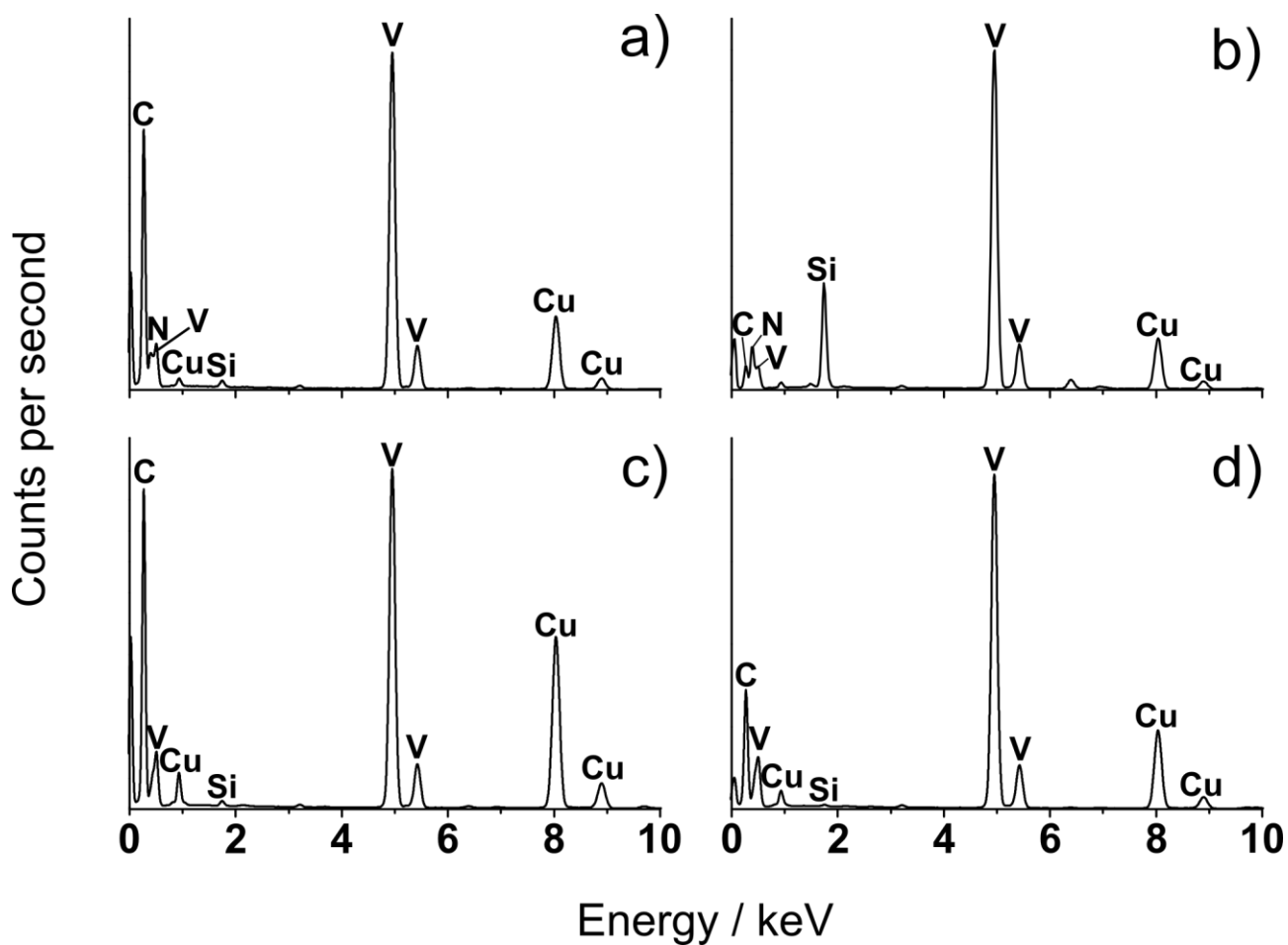


Figure S3: EDS spectra of VN: a) Sample derived from complex 1 with c) Sample derived from complex 3 and EDS spectra of VC: b) Sample derived from complex 1 with d) Sample derived from complex 3. Copper emanated from the copper TEM grid.

Additional XRD data:

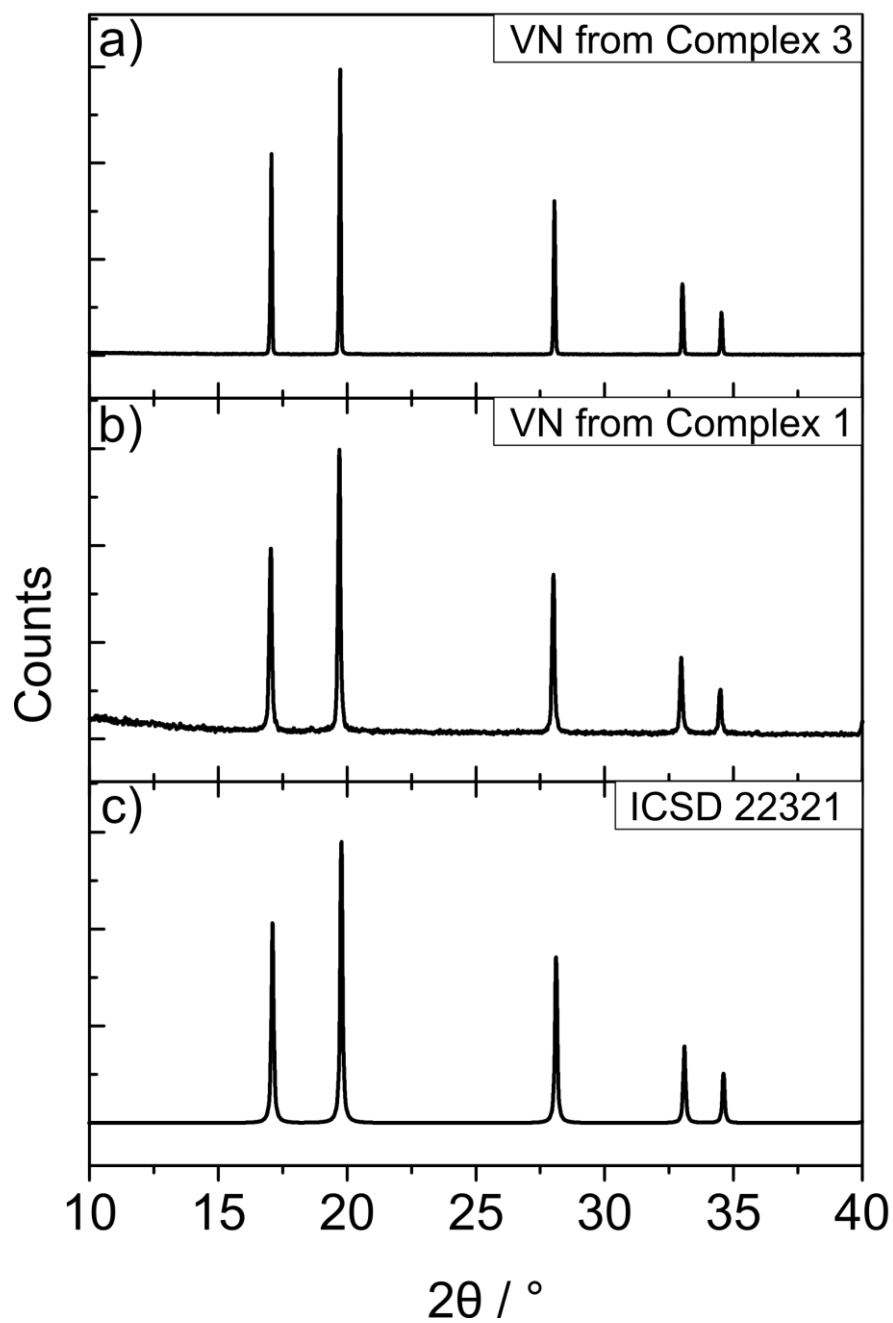


Figure S5: XRD patterns of VN: a) Sample derived from complex 1 with c) Sample derived from complex 3. c) Shows an ICSD standard for VN (No. 22321).

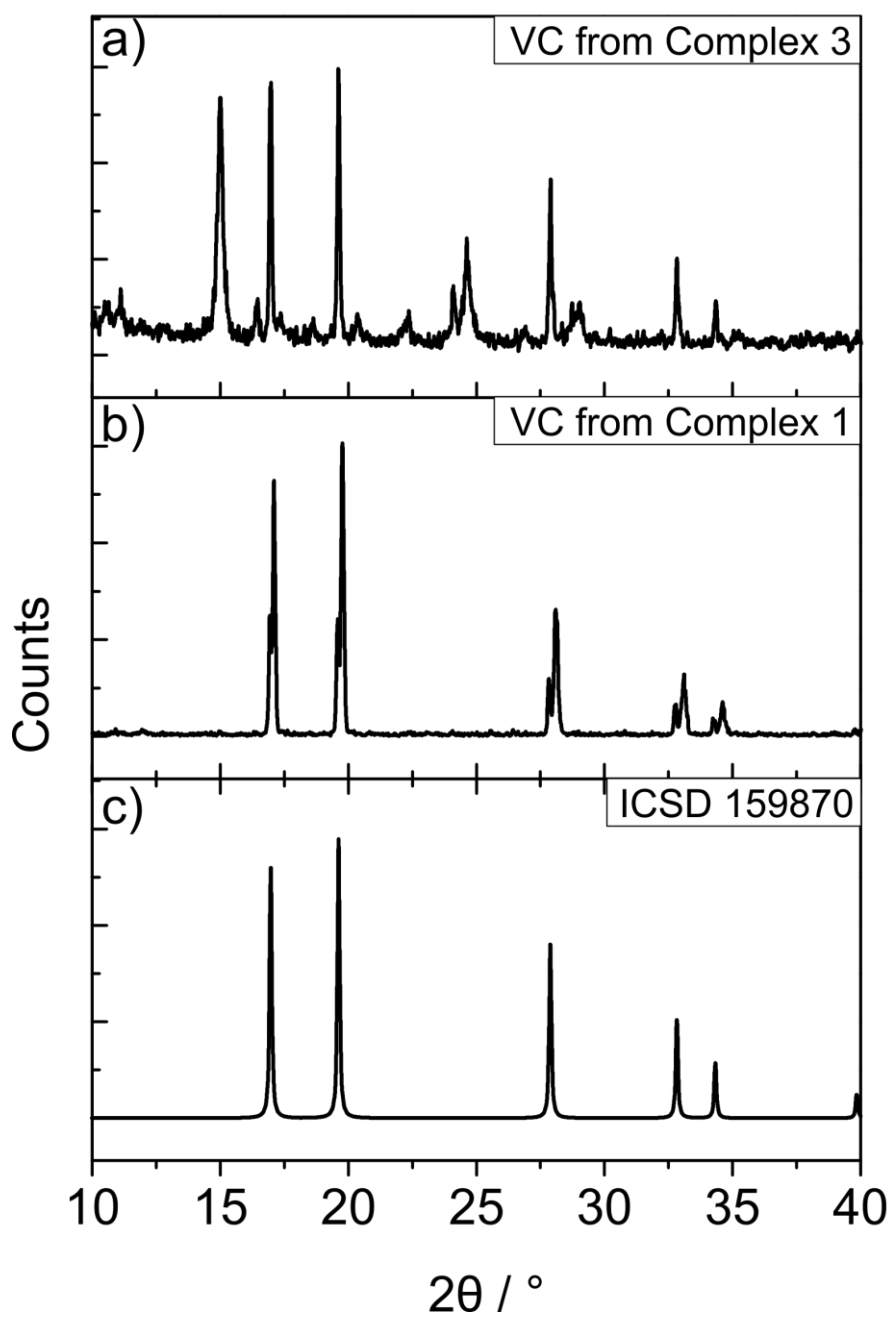


Figure S6: XRD patterns of VC: a) Sample derived from complex 3 with c) Sample derived from complex 1. c) Shows an ICSD standard for VC (No. 159870).

Additional XPS data:

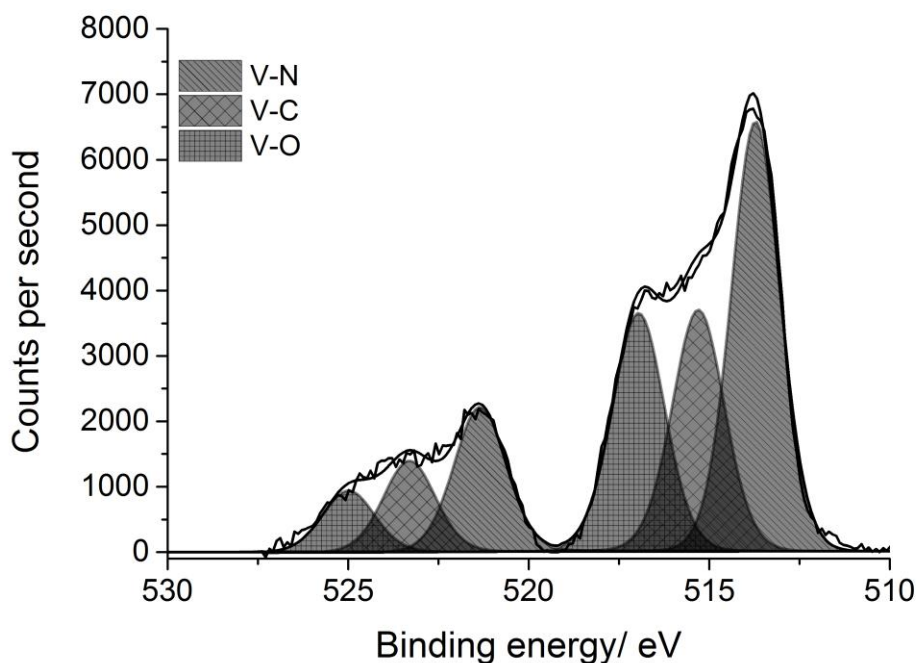


Figure S6: V_{2p} XPS spectrum of the VN sample derived from complex 2. Note the three environments of VN (major) as well as vanadium carbide and V⁵⁺, assigned as V₂O₅.

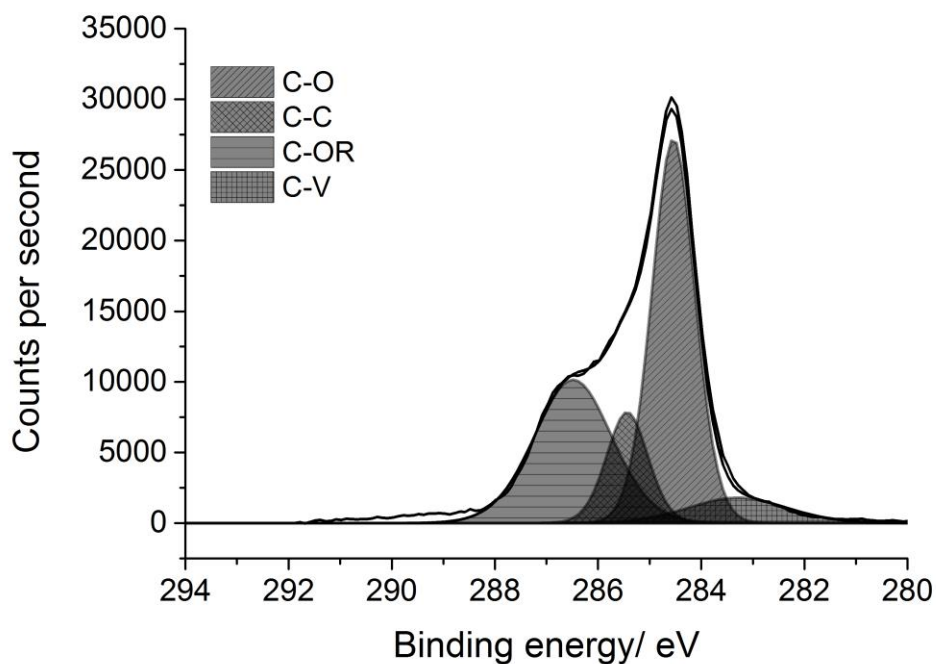


Figure S7: C_{1s} XPS spectrum of the VC sample derived from complex 2. The four environments are assigned as VC, C-O, C-OR and C-C.

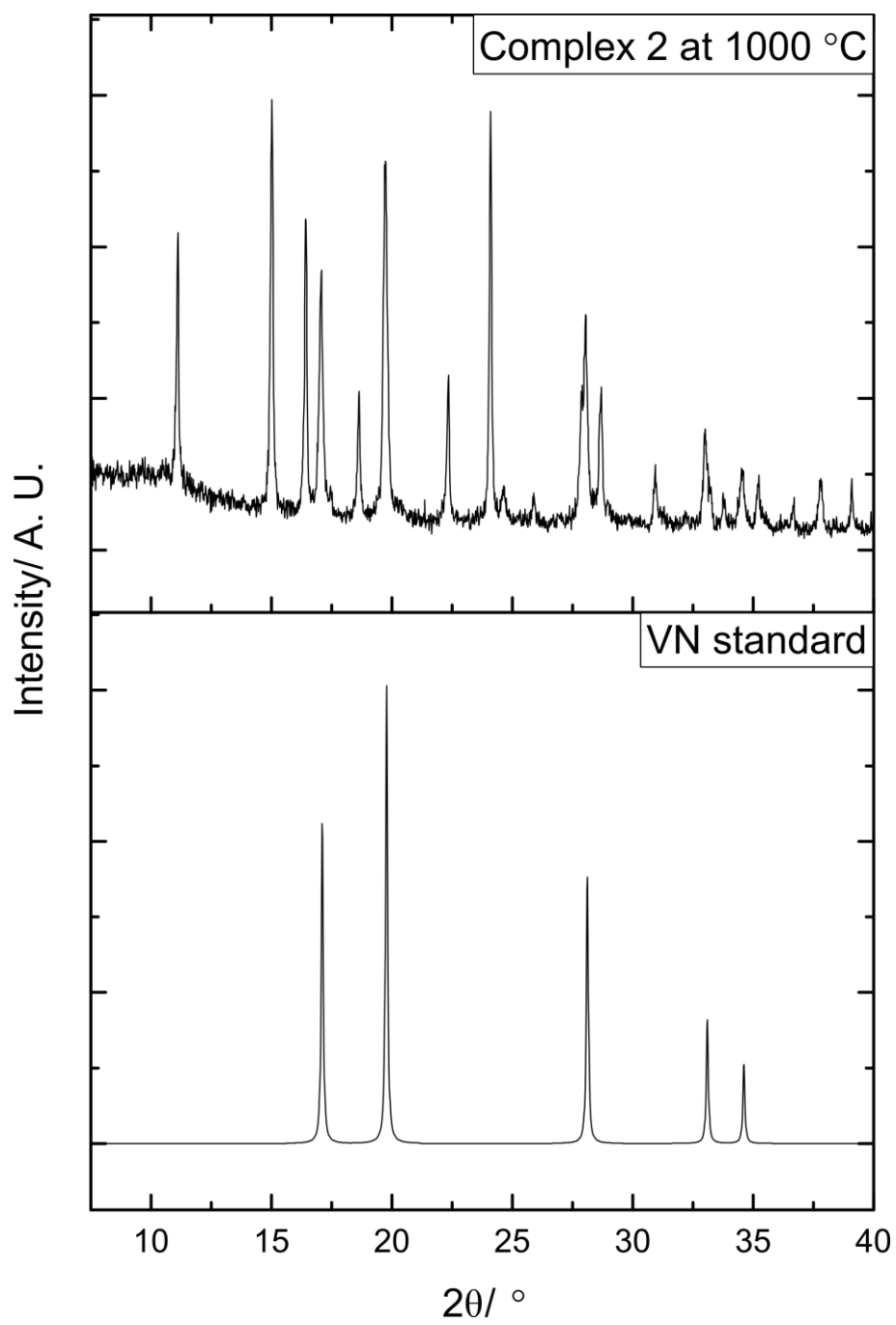


Figure S8: XRD patterns of complex 2 annealed at 1000 °C under nitrogen compared to VN ICSD