

SUPPLEMENTARY INFORMATION

**Effect of cycling conditions on hydride stability of the  $\text{Ti}_{11}\text{Nb}_{61}\text{Cr}_{28}$  alloy**

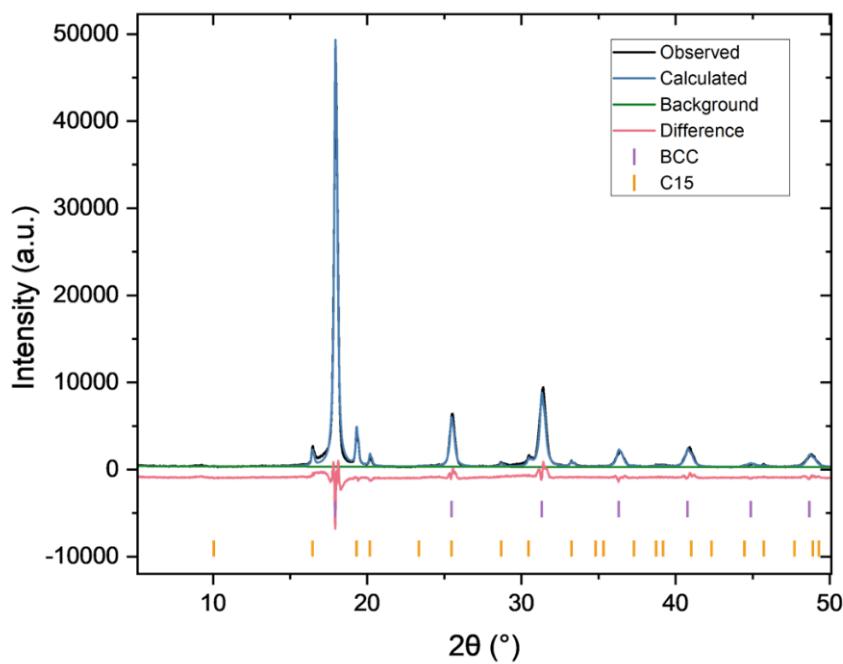
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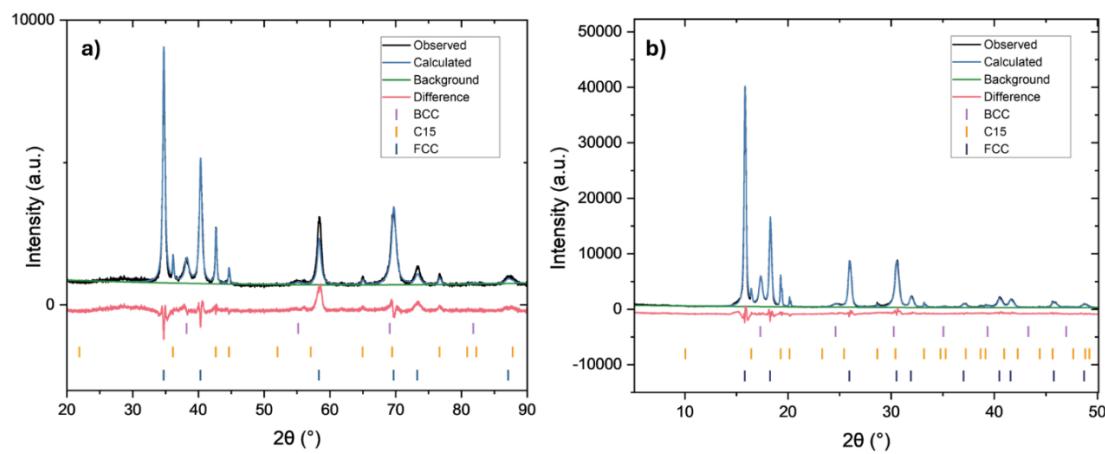
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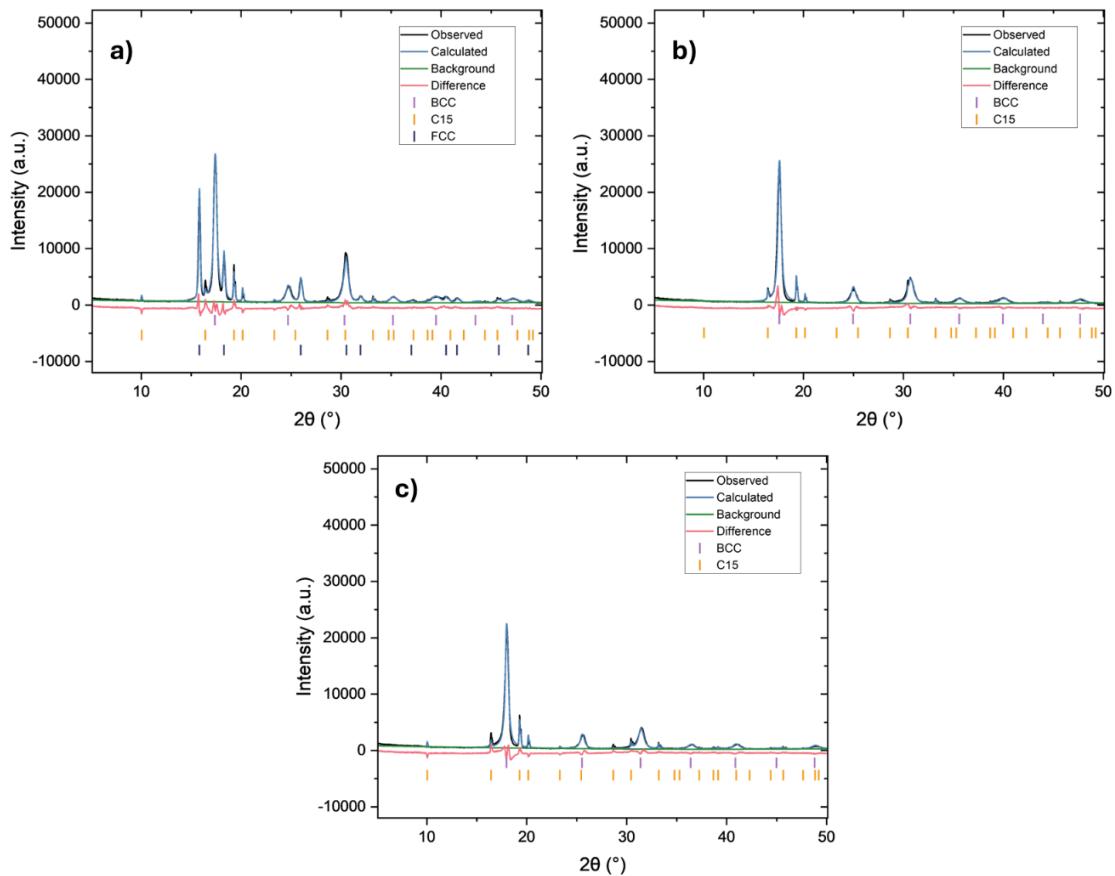
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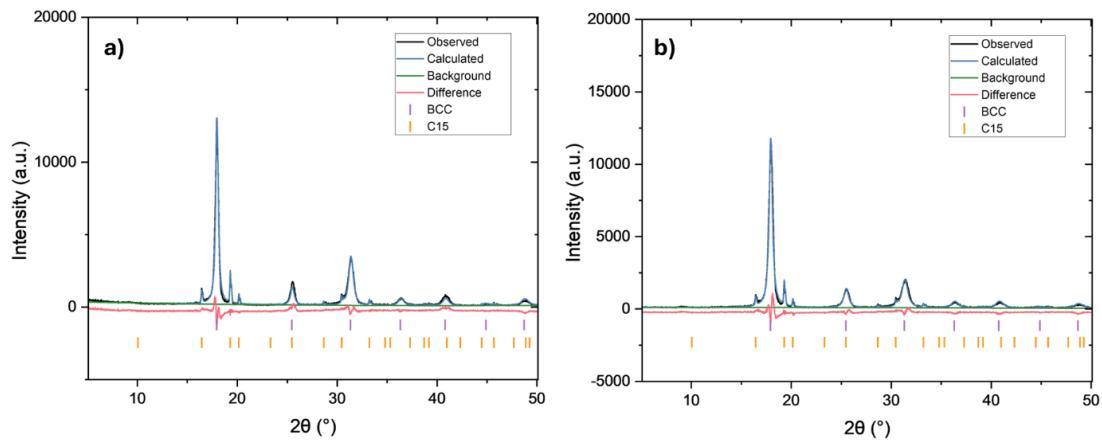
**Figure S1:** Rietveld refinement of the XRD pattern of the as-cast  $\text{Ti}_{11}\text{Nb}_{61}\text{Cr}_{28}$  alloy.



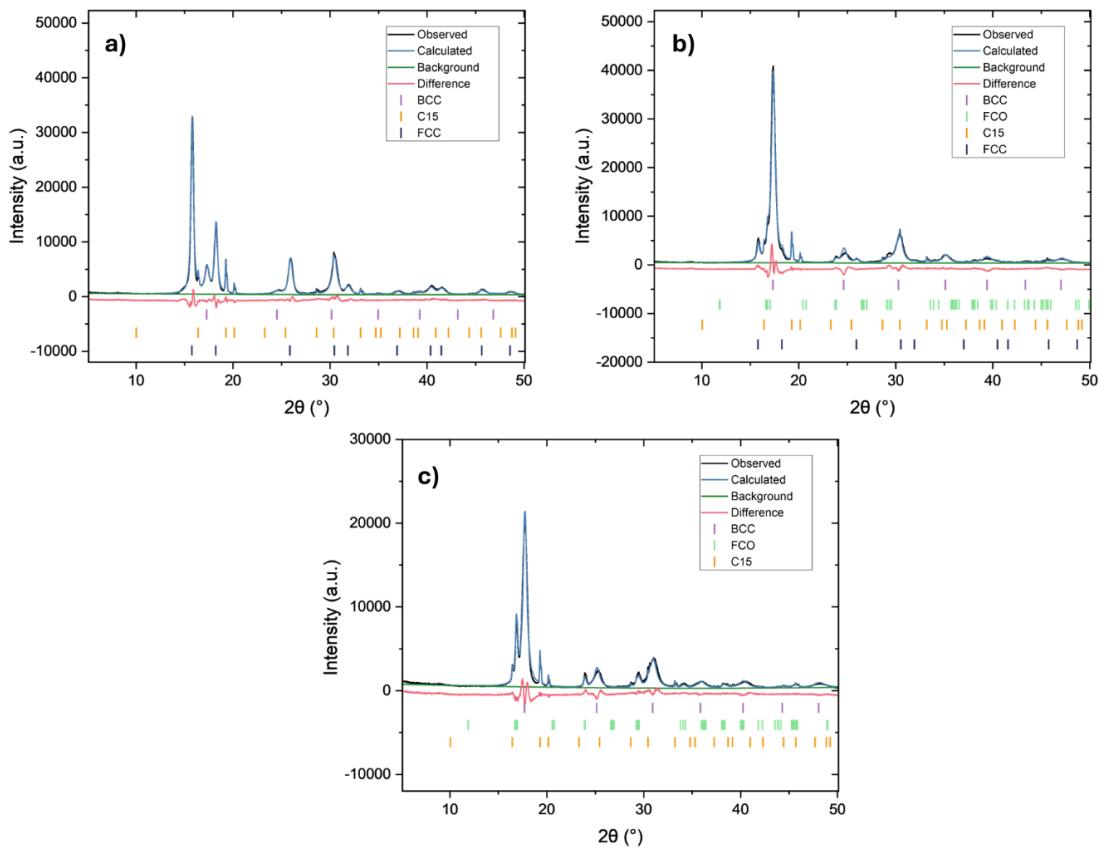
**Figure S2:** Rietveld refinement of the XRD pattern of the first-hydrogenated  $\text{Ti}_{11}\text{Nb}_{61}\text{Cr}_{28}$  alloy, a) 1 day and b) 700 days after hydrogenation.



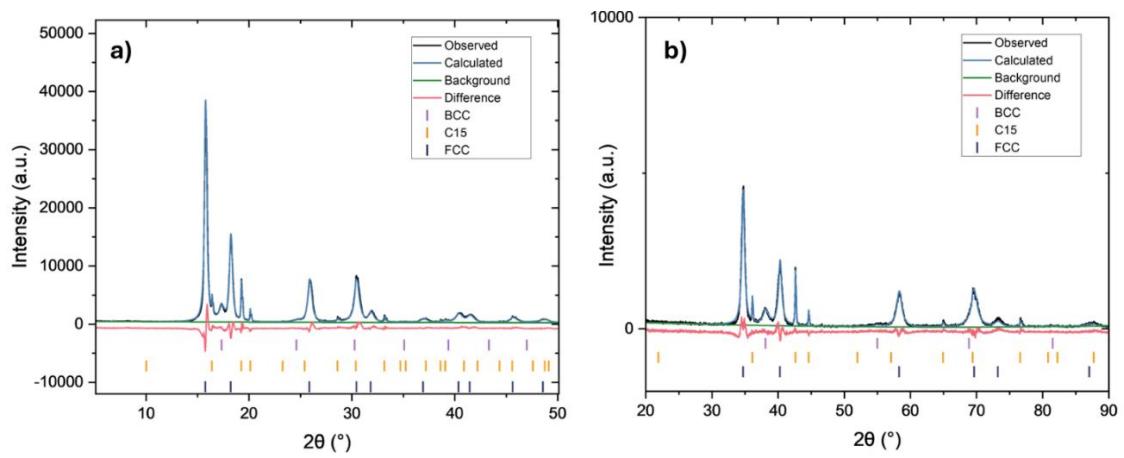
**Figure S3:** Rietveld refinement of the XRD pattern of the  $\text{Ti}_{11}\text{Nb}_{61}\text{Cr}_{28}$  alloy after DSC/TGA measurements up to a) 290 °C, b) 340 °C, and c) 550 °C.



**Figure S4:** Rietveld refinement of the XRD pattern of the  $\text{Ti}_{11}\text{Nb}_{61}\text{Cr}_{28}$  alloy after desorption at  $350\text{ }^{\circ}\text{C}$  in the a) 1<sup>st</sup> and b) 10<sup>th</sup> cycles.



**Figure S5:** Rietveld refinement of the XRD pattern of the hydrogenated  $\text{Ti}_{11}\text{Nb}_{61}\text{Cr}_{28}$  alloy after 10 cycles with absorption at  $25\text{ }^{\circ}\text{C}$  and desorption at  $350\text{ }^{\circ}\text{C}$ , a) 1 day, b) 120 days, and c) 260 days after hydrogenation.



**Figure S6:** Rietveld refinement of the XRD pattern of the hydrogenated  $\text{Ti}_{11}\text{Nb}_{61}\text{Cr}_{28}$  alloy after 20 cycles with absorption and desorption at 25 °C, a) 1 day and b) 120 days after hydrogenation.