Critical Temperature and Pressure Conditions of Degradation During Thermochemical Hydrogen Compression: A Case Study of V-Based Hydrogen Storage Alloy

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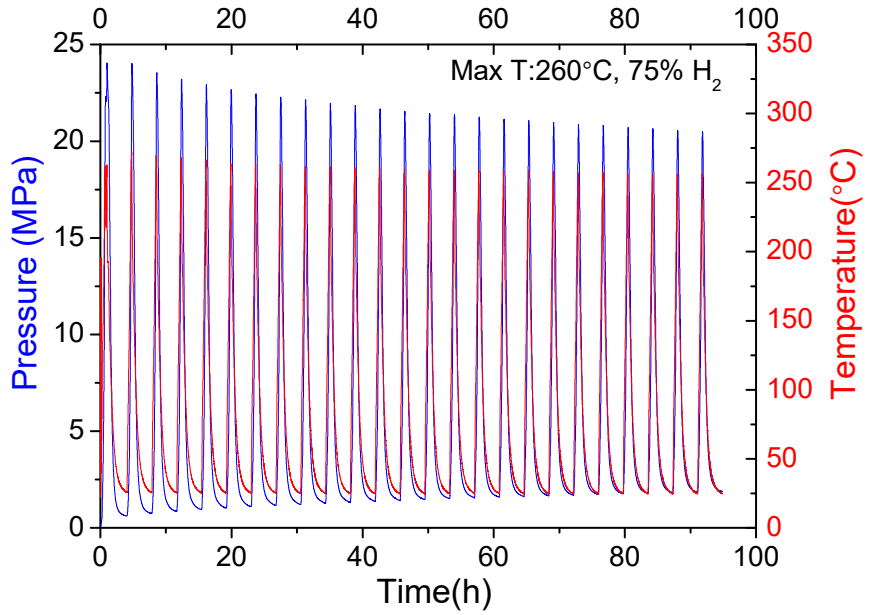

Figure S1. Pressure and temperature changes for 25 cyclic compressor tests of $V_{20}Ti_{32}Cr_{48}$ alloy with 75% saturated H_2 up to a maximum temperature of 260 °C.

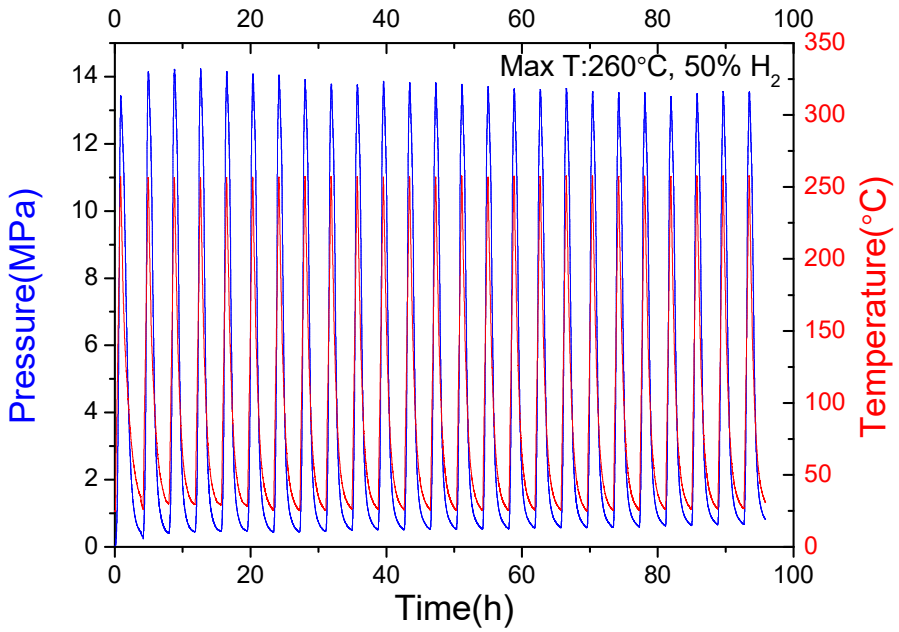

Figure S2. Pressure and temperature changes for 25 cyclic compressor tests of $V_{20}Ti_{32}Cr_{48}$ alloy with 50% saturated H_2 up to a maximum temperature of 260 °C.

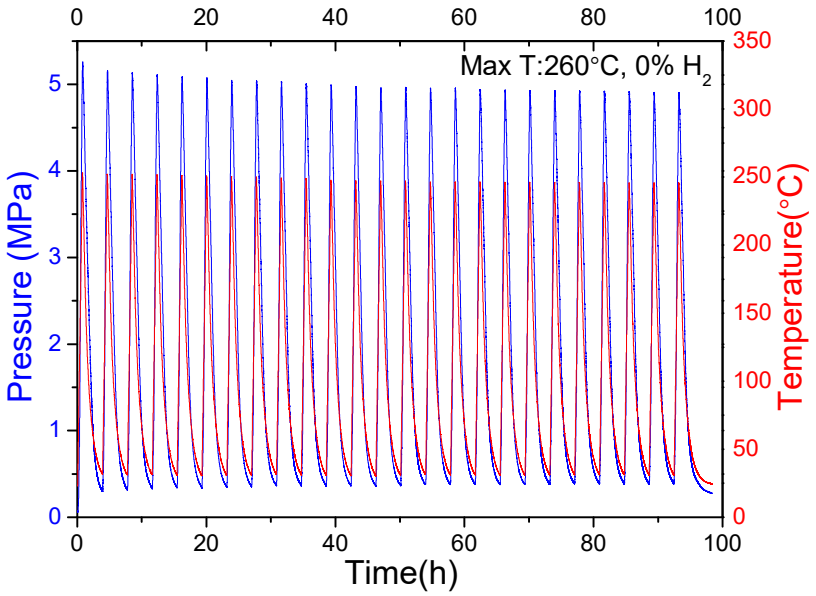

Figure S3. Pressure and temperature changes for 25 cyclic compressor tests of $V_{20}Ti_{32}Cr_{48}$ alloy with solid solution of H_2 up to a maximum temperature of 260 °C.

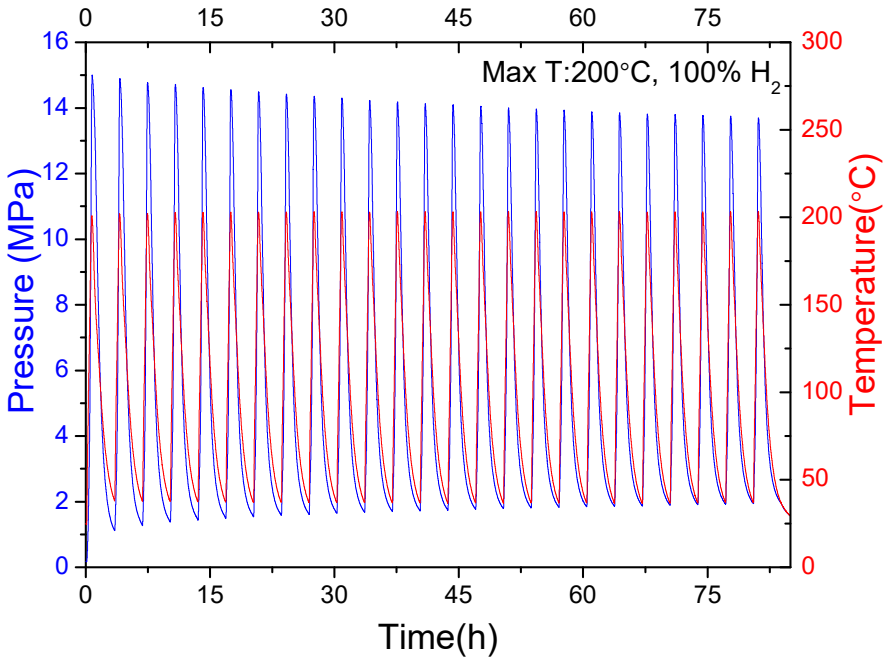

Figure S4. Pressure and temperature changes for 25 cyclic compressor tests of V20Ti32Cr48 alloy with 100% saturated H2 up to a maximum temperature of 200 °C.

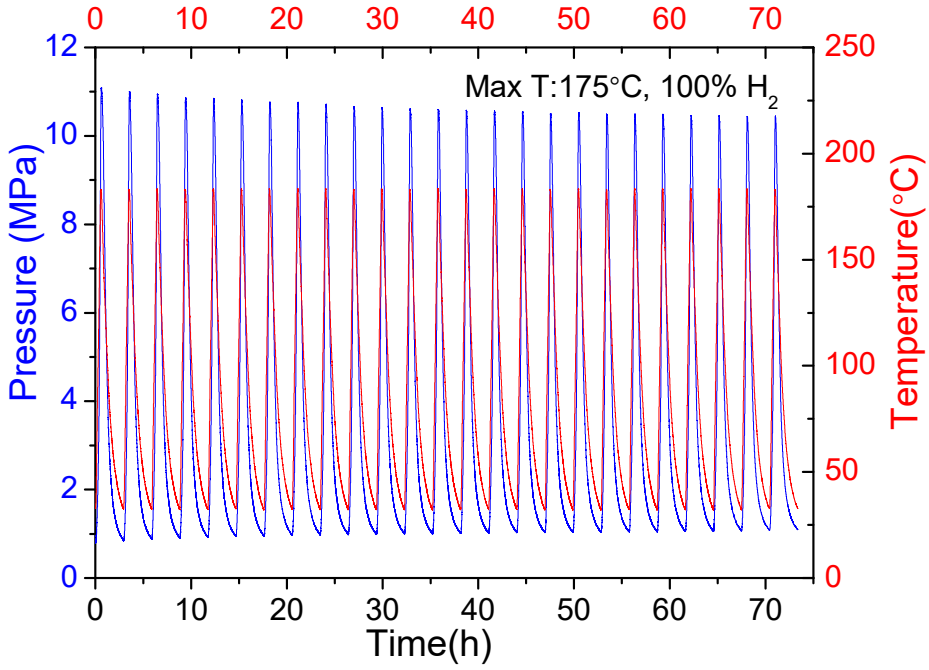

Figure S5. Pressure and temperature changes for 25 cyclic compressor tests of $V_{20}Ti_{32}Cr_{48}$ alloy with 100% saturated H_2 up to a maximum temperature of 175 °C.

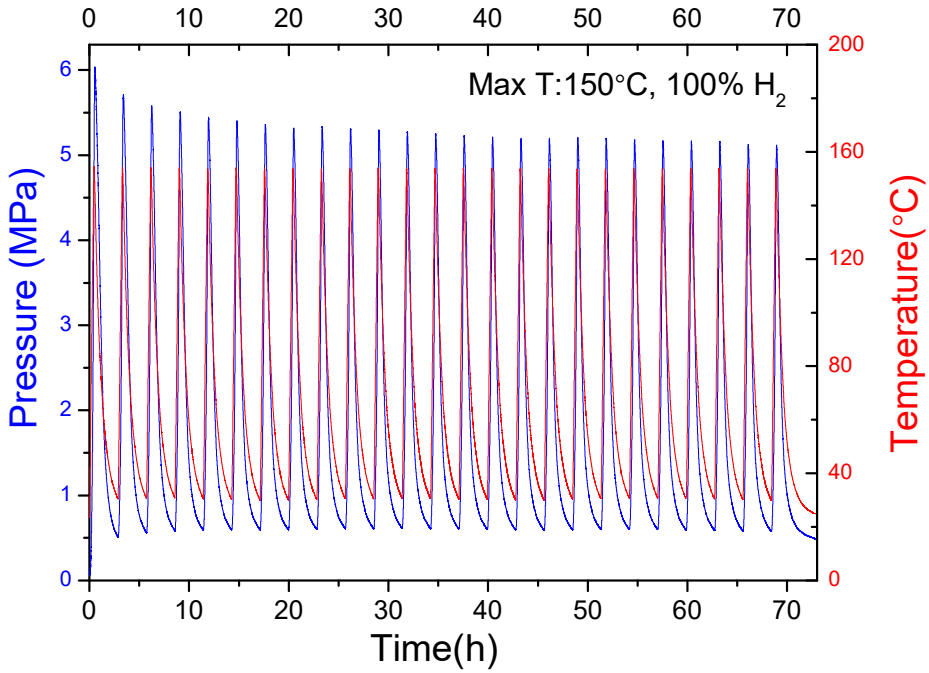

Figure S6. Pressure and temperature changes for 25 cyclic compressor tests of $V_{20}Ti_{32}Cr_{48}$ alloy with 100% saturated H_2 up to a maximum temperature of 150 °C.

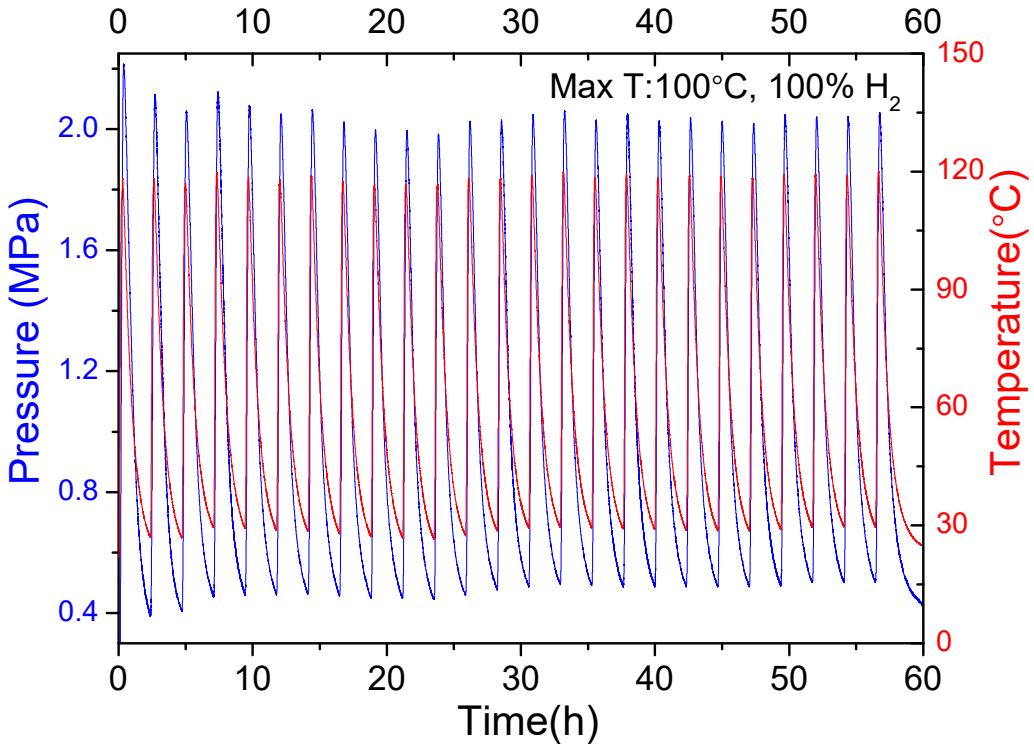

Figure S7. Pressure and temperature changes for 25 cyclic compressor tests of $V_{20}Ti_{32}Cr_{48}$ alloy with 100% saturated H_2 up to a maximum temperature of 100 °C.

Table S1. Summary of detailed parameters for hydrogen compressor cycling test for $V_{20}Ti_{32}Cr_{48}$ alloy at various conditions.

Percentage of filled H_2/%	Initial Pressure/MPa	Initial temperature/°C	Initial H content/wt%	Aimed temperature/°C	Achieved max pressure/MPa	Capacity losses/%
100	0.07	23.2	2.4	240	27.8	20.2
100	0.1	22	2.4	200	14.9	17.9
100	0.09	22.1	2.3	175	11	3.1
100	0.07	22	2.3	150	5.7	5.0
100	0.07	22.4	2.2	100	2.1	4.0
75	0.06	22.5	2.1	260	25.4	22.5
75	0.06	23.1	2.1	200	18.7	7.2
50	0.05	23	1.6	260	14.1	4.1
50	0.04	23.8	1.6	200	13.4	3.6
50	0.03	20.2	1.6	150	5.4	5.9
50	0.05	22.5	1.7	100	1.1	4.6
0	0.03	22.7	1.0	260	5.1	5.4
0	0.03	21	0.8	200	7.8	4.5
0	0.02	22.2	0.9	150	1.3	1.3
0	0.03	22	0.9	100	1	4.2