Supporting information for:

An Electrochemical Technique for Controlled Dissolution of Zirconium Based Components of Light Water Reactors

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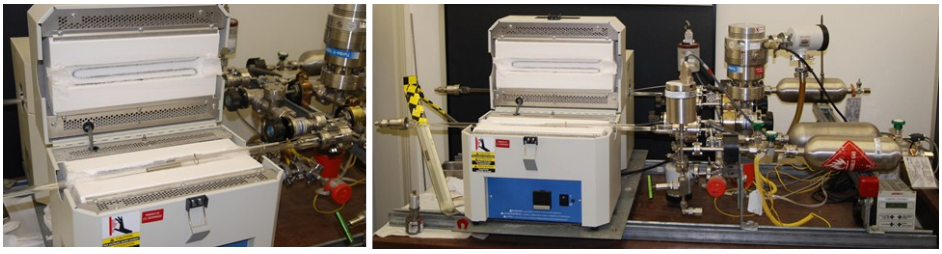

Figure S1. Instrumentation of the tube furnace assembly for loading the liner with specified amounts of H/D.

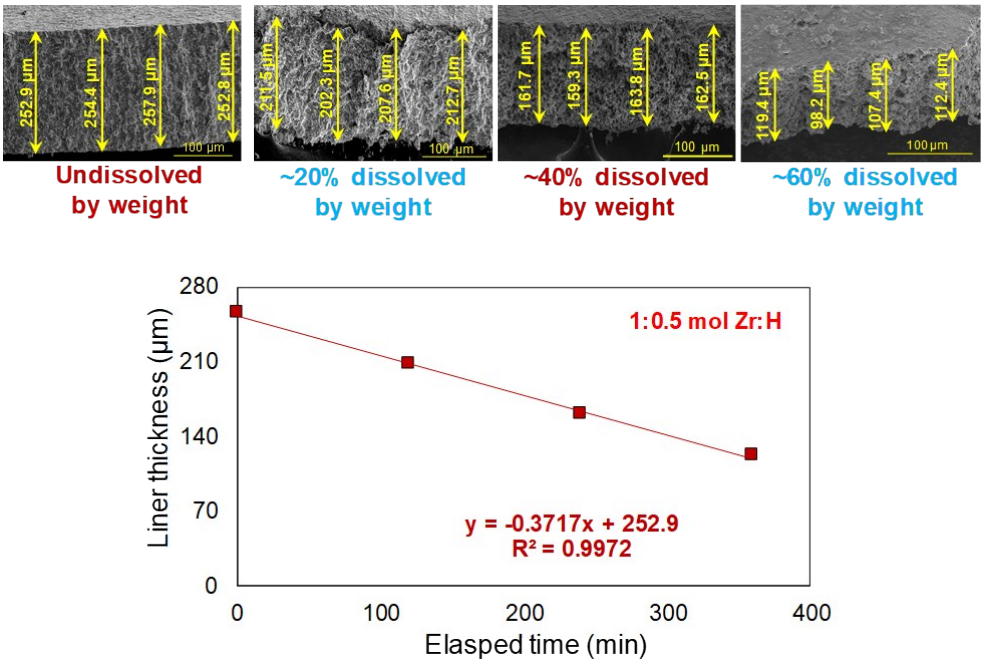

Figure S2. Dissolution kinetics of H-loaded liner (1:0.5 mol Zr:H) measured by liner thickness changes with time at a constant applied potential (225 mV vs Ag.AgCl) in 1 M aqueous KCl: (Top panels) Cross–sectional images of liner upon progressive dissolution, (bottom panel) Dissolution kinetics of the liner measured by liner thickness changes with time.

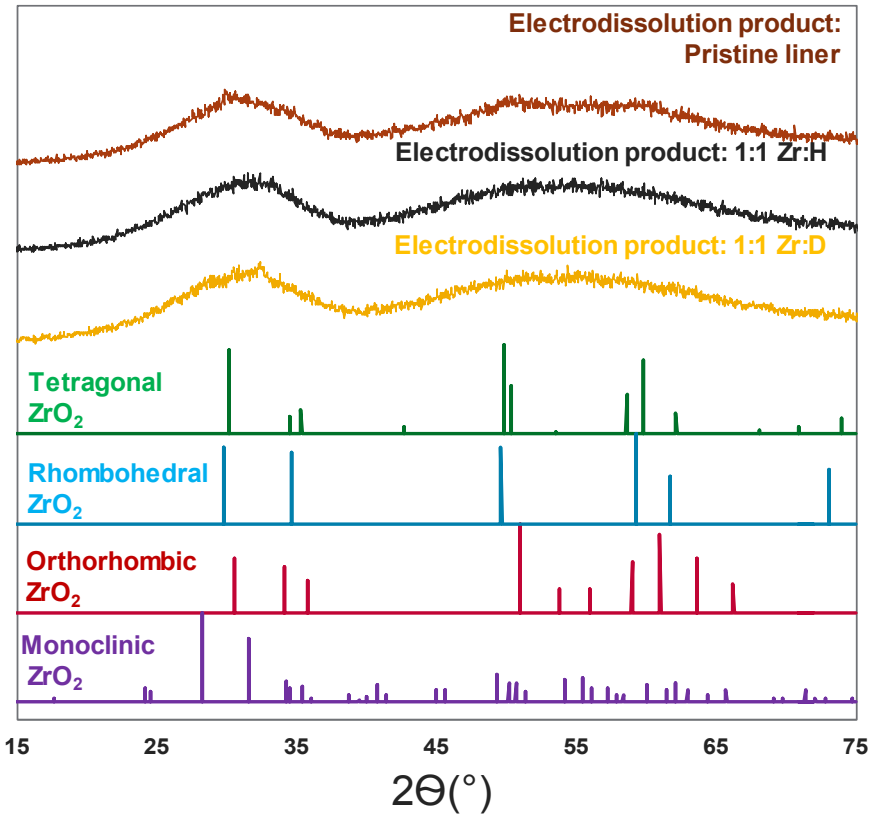

Figure S3. Comparison of experimental XRD patterns with those obtained from literature[1]: (top, brown trace) Product obtained from electrodissolution of pristine Zr-4 liner, (second from the top, black trace) Product obtained from electrodissolution of H-loaded Zr-4 liner (1: 1 mol Zr:H), (third from the top, yellow trace) Product obtained from electrodissolution of D-loaded Zr-4 liner (1: 1 mol Zr:D), (fourth from the top, green trace) tetragonal ZrO_2 from literature (#00-017-0923),[2-3] (third from the bottom, blue trace) rhombohedral ZrO_2 from literature (#00-037-0031),[4] (second from the bottom, red trace) orthorhombic ZrO_2 from literature (#00-034-1084),[5] (bottom, violet trace) monoclinic ZrO_2 from literature (#00-013-0307).[6]

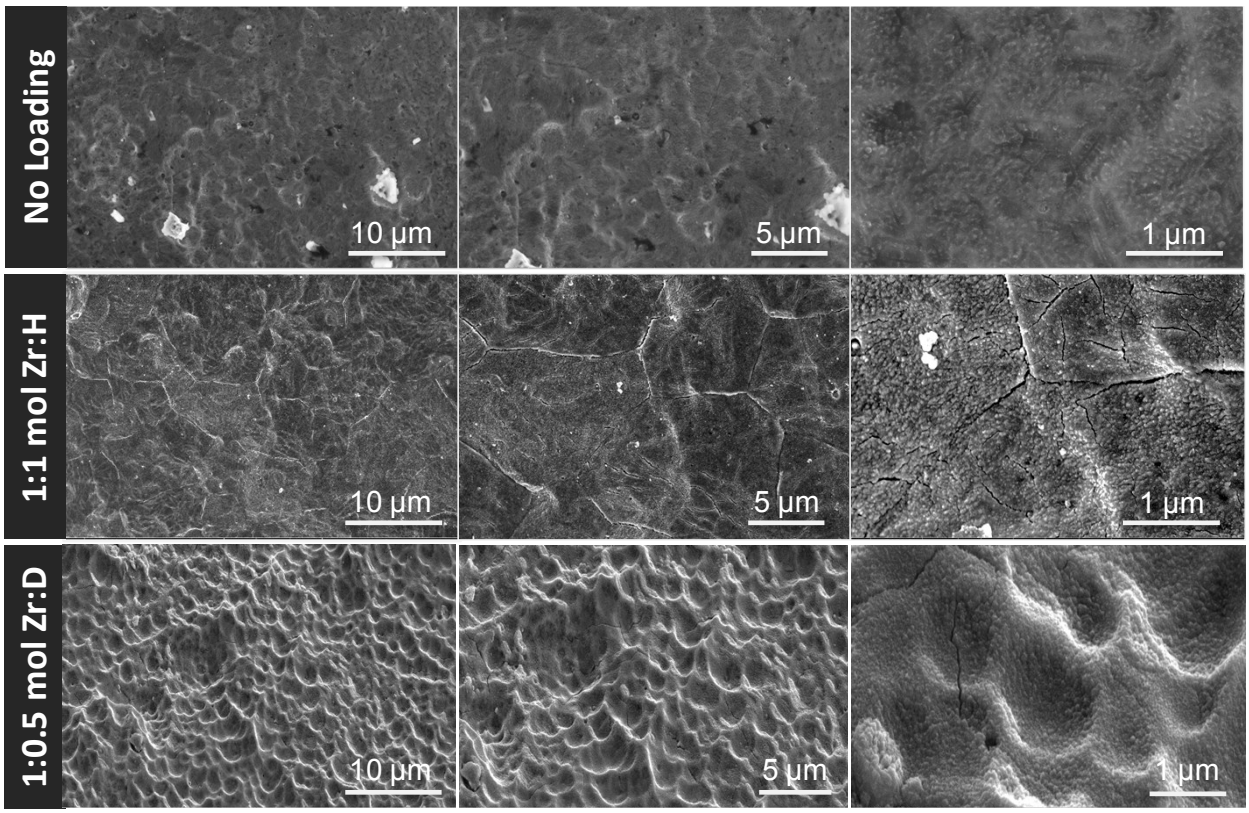

Figure S4. Representative secondary electron SEM images of Zr-4 liners prior to electrodissolution at different magnifications: (top row) unloaded lines, (middle row) H-loaded liners 1:1 mol Zr:H, (bottom row) D-loaded liners 1:1 mol Zr:D

References:

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3. Teufer, G., Crystal Structure of Tetragonal Zro2. *Acta Crystallogr* **1962,** *15* (Nov), 1187-+.
4. Hasegawa, H., Rhombohedral Phase Produced in Abraded Surfaces of Partially Stabilized Zirconia (Psz). *J Mater Sci Lett* **1983,** *2* (3), 91-93.
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6. Garvie, R. C., Phase Analysis in Zirconia Systems. *J Am Ceram Soc* **1972,** *55* (6), 303-&.