Supplementary Information

Table 1. HSC Chemistry calculations for the chemical reaction UC + 3Pd = UPd_3 + C

T	deltaH	deltaS	normalized Pd	deltaG
C	kJ	J/K		kJ
25.000	-426.094	9.414	-142.967	-428.901
125.000	-427.859	4.336	-143.195	-429.585
225.000	-429.741	0.115	-143.266	-429.799
325.000	-431.515	-3.134	-143.214	-429.641
425.000	-433.163	-5.683	-143.065	-429.195
525.000	-434.734	-7.787	-142.840	-428.519
625.000	-436.303	-9.638	-142.549	-427.646
725.000	-437.926	-11.351	-142.199	-426.596
825.000	-439.648	-12.995	-141.793	-425.378
925.000	-441.515	-14.621	-141.332	-423.997
1025.000	-443.561	-16.260	-140.818	-422.454
1125.000	-445.811	-17.928	-140.248	-420.744
1200.000	-447.643	-19.204	-139.784	-419.352

Table 2. HSC Chemistry calculations for the chemical reaction U_2C_3 + 6Pd = 2UPd_3 + 3C

T	deltaH	deltaS	normalized Pd	deltaG
C	kJ	J/K		kJ
25.000	-864.699	5.197	-144.375	-866.248
125.000	-868.073	-4.514	-144.379	-866.275
225.000	-871.517	-12.246	-144.236	-865.417
325.000	-874.542	-17.792	-143.983	-863.899
425.000	-877.164	-21.853	-143.651	-861.908
525.000	-879.568	-25.071	-143.259	-859.557
625.000	-881.980	-27.918	-142.818	-856.906
725.000	-884.597	-30.678	-142.329	-853.976
825.000	-887.584	-33.526	-141.795	-850.767
925.000	-891.105	-36.591	-141.211	-847.263
1025.000	-895.305	-39.954	-140.573	-843.439
1125.000	-900.304	-43.659	-139.877	-839.261
1200.000	-904.640	-46.679	-139.312	-835.875

Table 3. HSC Chemistry calculations for the chemical reaction $UO_2+3Pd=UPd_3+O_2$

UO2 + 3Pd = UPd3 + O2(g)				
T	**deltaH**	**deltaS**	**normalized Pd**	**deltaG**
C	kJ	J/K		kJ
25.000	560.999	190.996	168.018	504.054
125.000	559.708	187.321	161.709	485.126
225.000	557.875	183.227	155.533	466.600
325.000	555.845	179.516	149.489	448.467
425.000	553.722	176.236	143.561	430.683
525.000	551.523	173.294	137.736	413.209
625.000	549.218	170.575	132.006	396.017
725.000	546.773	167.995	126.363	379.089
825.000	544.163	165.504	120.805	362.415
925.000	541.359	163.062	115.329	345.987
1025.000	538.342	160.645	109.934	329.801
1125.000	535.099	158.239	104.619	313.857
1200.000	456.462	132.022	87.325	261.974

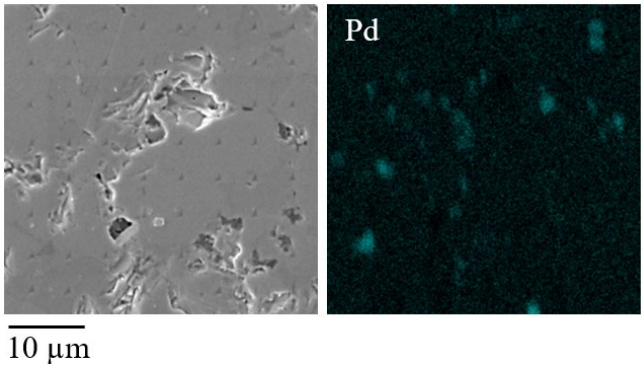


Figure S1. EDS map confirming presence of Pd precipitates at the interaction zone where the nanoindentation array was done.

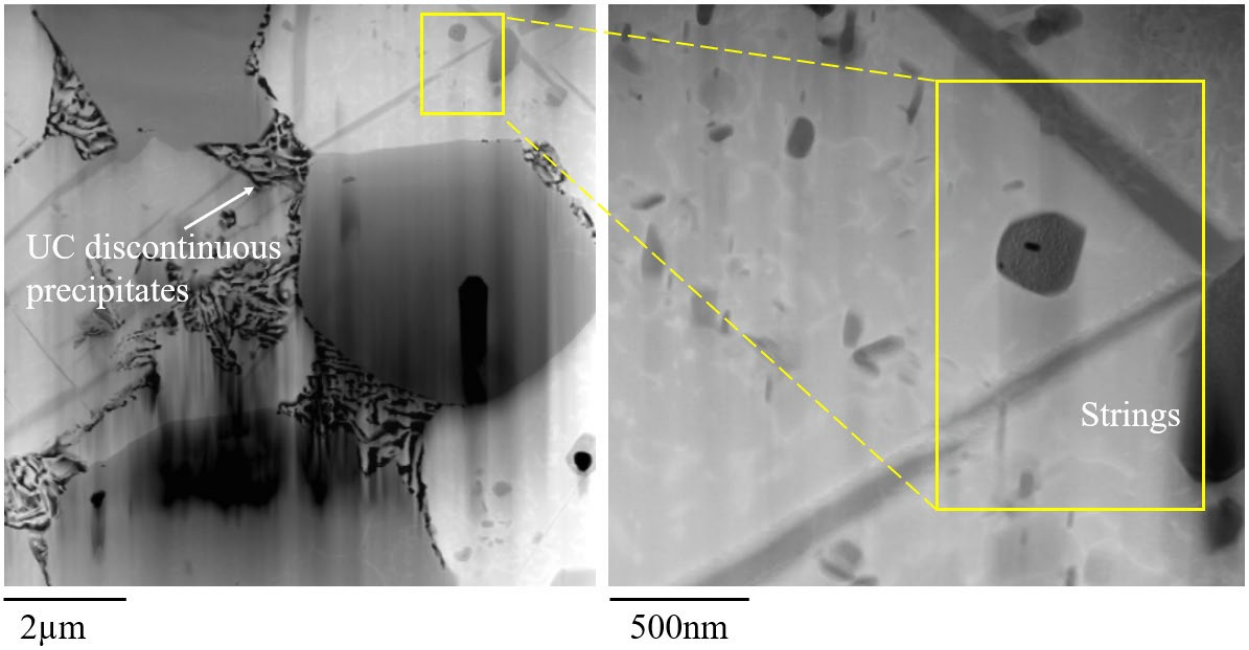


Figure S2. U_2C_3 string precipitate and discontinuous precipitates observed in the unreacted region.

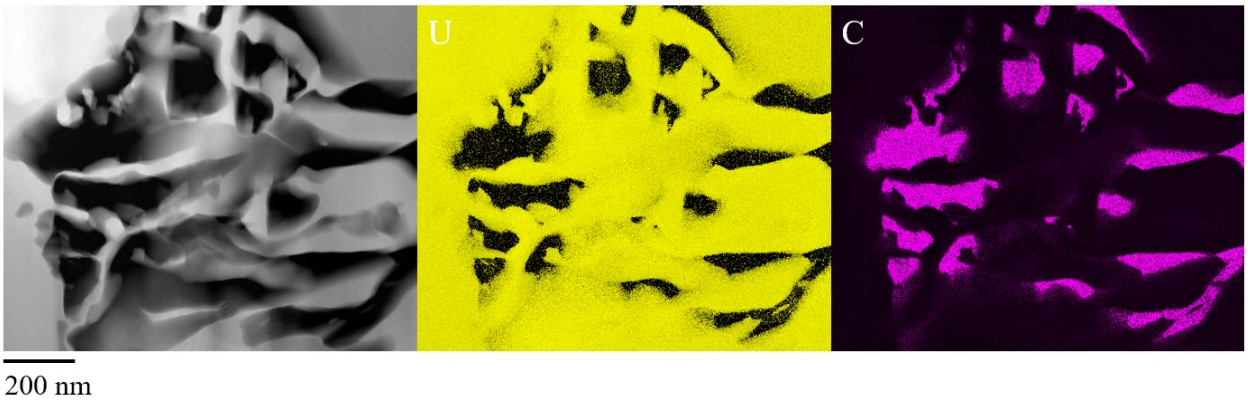


Figure S3. High magnification STEM-EDS map of discontinuous precipitate at the annealed UCO. Images show alternating lamellar structures of UC and carbon.