

Supporting Information

Excessive consumption mechanism of hydrazine in the reaction with ReO_4^- : Re species evolution and $\text{ReO}_2 \cdot n\text{H}_2\text{O}$ catalyzed decomposition

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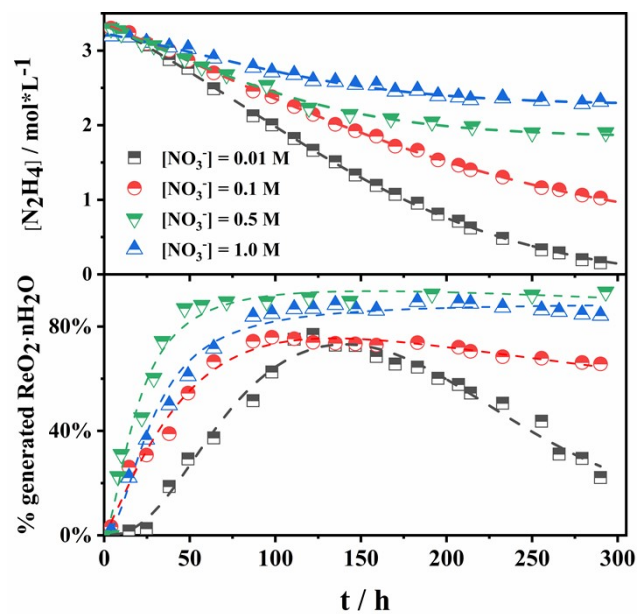


Figure S1. Time dependence of the hydrazine concentration and percentage of generated $\text{ReO}_2 \cdot n\text{H}_2\text{O}$ in the reaction with varying nitrate ions concentrations : $[\text{N}_2\text{H}_4] = 3.3\text{M}$, $[\text{ReO}_4^-] = 8.6 \text{ mM}$, $\text{pH} = 13$, $T = 308 \text{ K}$

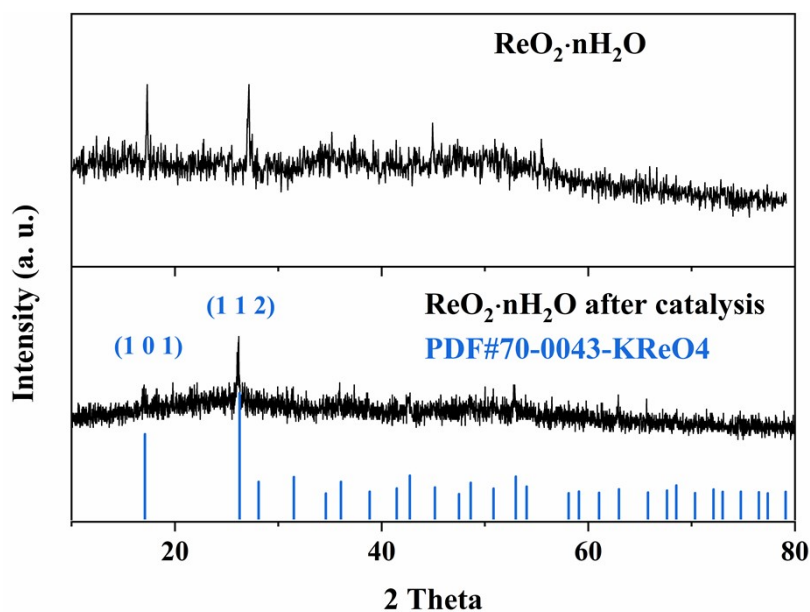


Figure S2. Powder XRD of $\text{ReO}_2 \cdot n\text{H}_2\text{O}$ and $\text{ReO}_2 \cdot n\text{H}_2\text{O}$ after catalyzed decomposition of hydrazine.

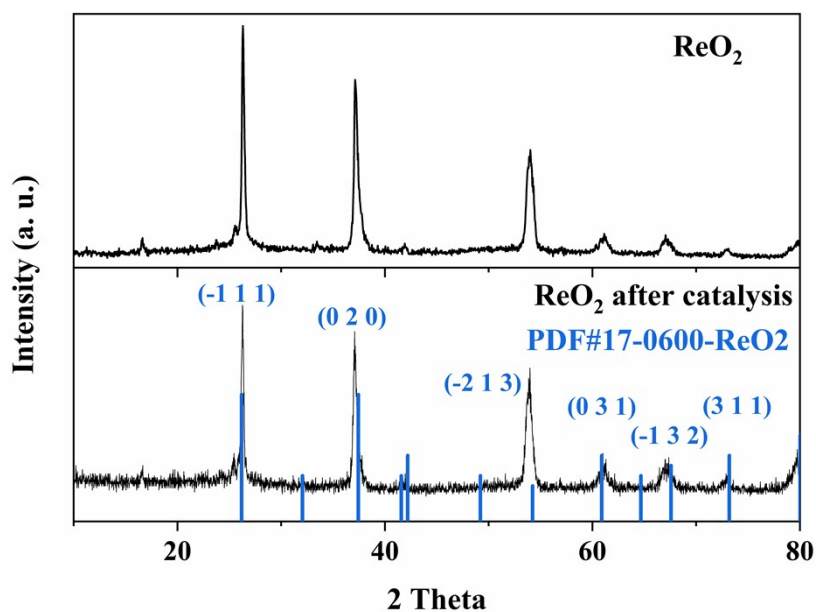


Figure S3. Powder XRD of ReO_2 and ReO_2 after catalyzed decomposition of hydrazine.

Table S1. Estimation of average oxidation state and fraction of Re(IV) and Re(VII) in reaction filtrate at different reaction times. The estimates are from linear interpolation between Re(IV) and Re(VII) references.

Sample	$E_0(\text{eV})$	Average oxidation state	IV fraction	VII fraction
KReO_4	10540.20	7.00	0 %	100 %
ReO_2	10538.81	4.00	100 %	0 %
10 h	10539.49	5.47	51 %	49 %
46 h	10538.81	4.00	100 %	0 %
62 h	10538.81	4.00	100 %	0 %
240 h	10539.49	5.47	51 %	49 %
10 h (NO_3^-)	10539.36	5.19	60 %	40 %

46 h (NO ₃ ⁻)	10538.95	4.30	90 %	10 %
62 h (NO ₃ ⁻)	10538.81	4.00	100 %	0 %
240 h (NO ₃ ⁻)	10538.81	4.00	100 %	0 %
