

Supplementary Material

Methane Catalytic Combustion under Lean Conditions over Pristine and Ir-Loaded $\text{La}_{1-x}\text{Sr}_x\text{MnO}_3$ Perovskites: Efficiency, Hysteresis, and Time-On-Stream and Thermal Aging Stabilities

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Supplementary Figures

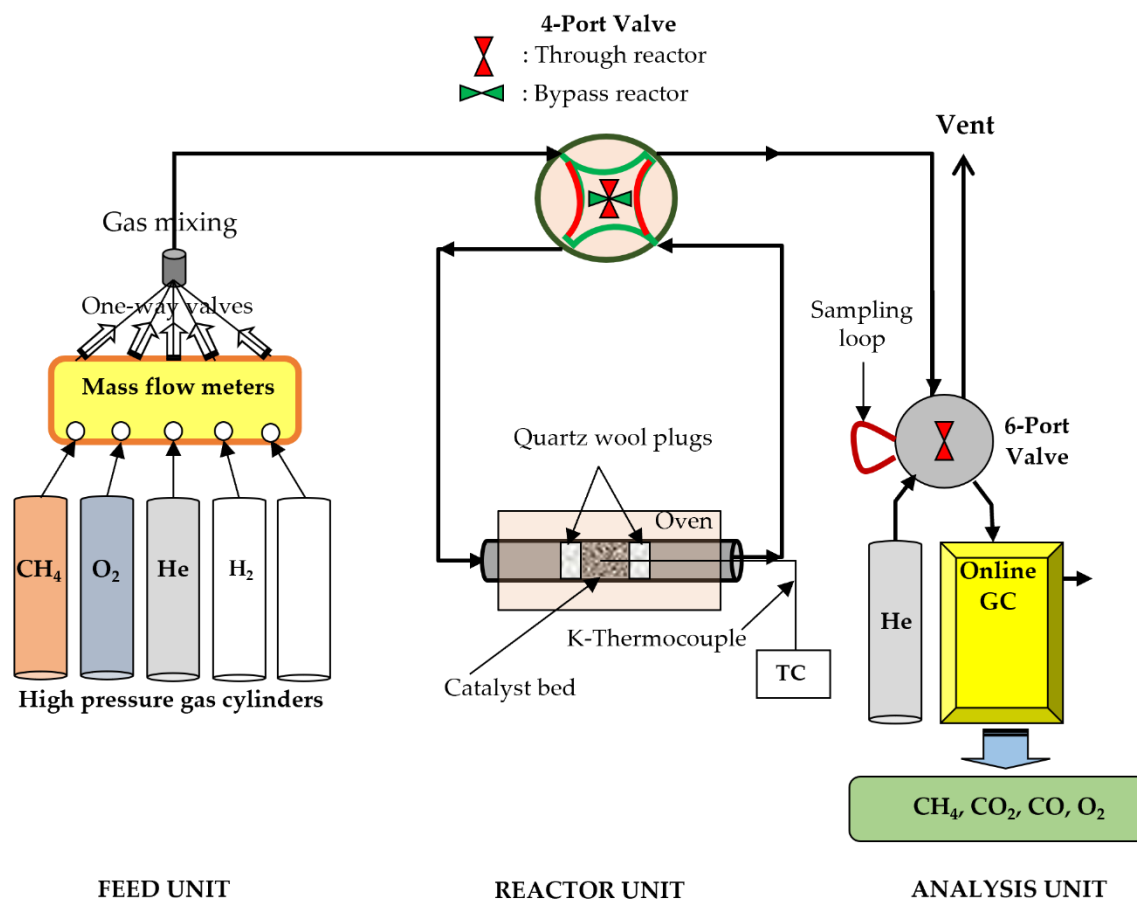


Figure S1. Schematic configuration of the continuous flow experimental apparatus equipped with on-line Gas Chromatography.

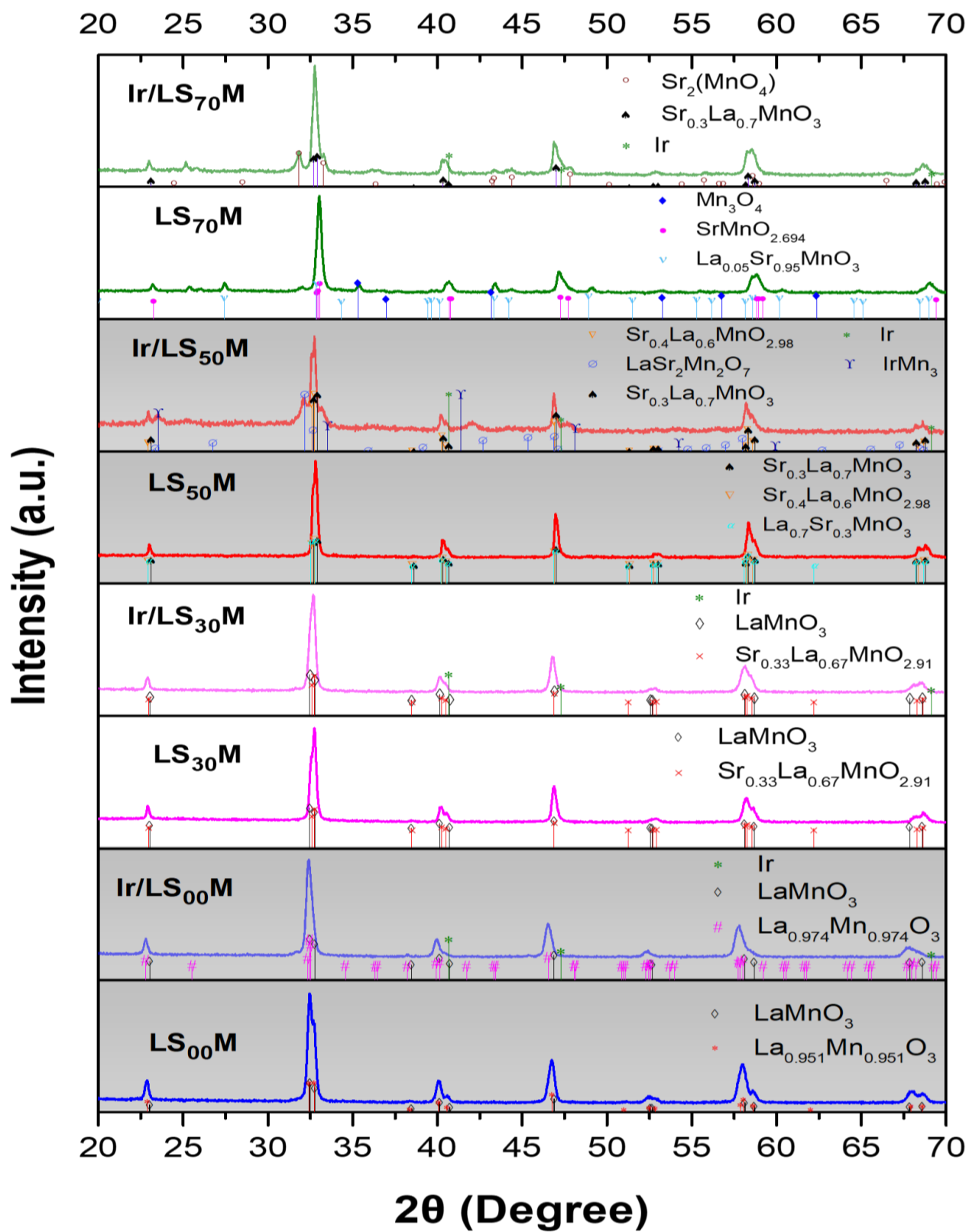


Figure S2. XRD patterns of LS_xM perovskites ($\text{La}_{1-x}\text{Sr}_x\text{MnO}_3$; $x = 0, 30, 50$ and 70% substitution of La by Sr) and the corresponding 2 wt% Ir/LS_xM catalysts.

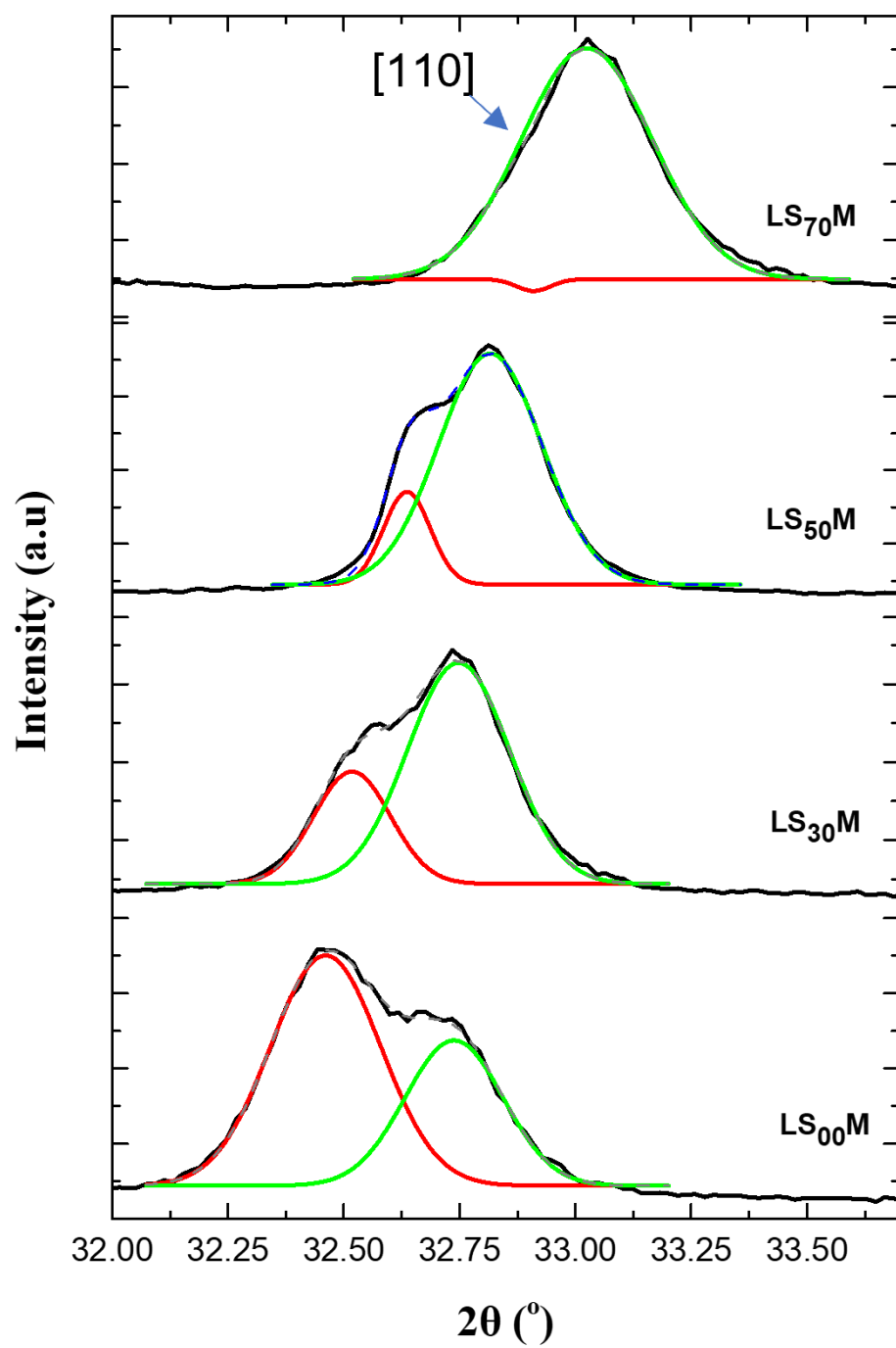


Figure S3. Magnification of the XRD patterns of LS_xM perovskites at the region $2\theta = 32 - 34^\circ$, where the main peak of the perovskite phase appears.

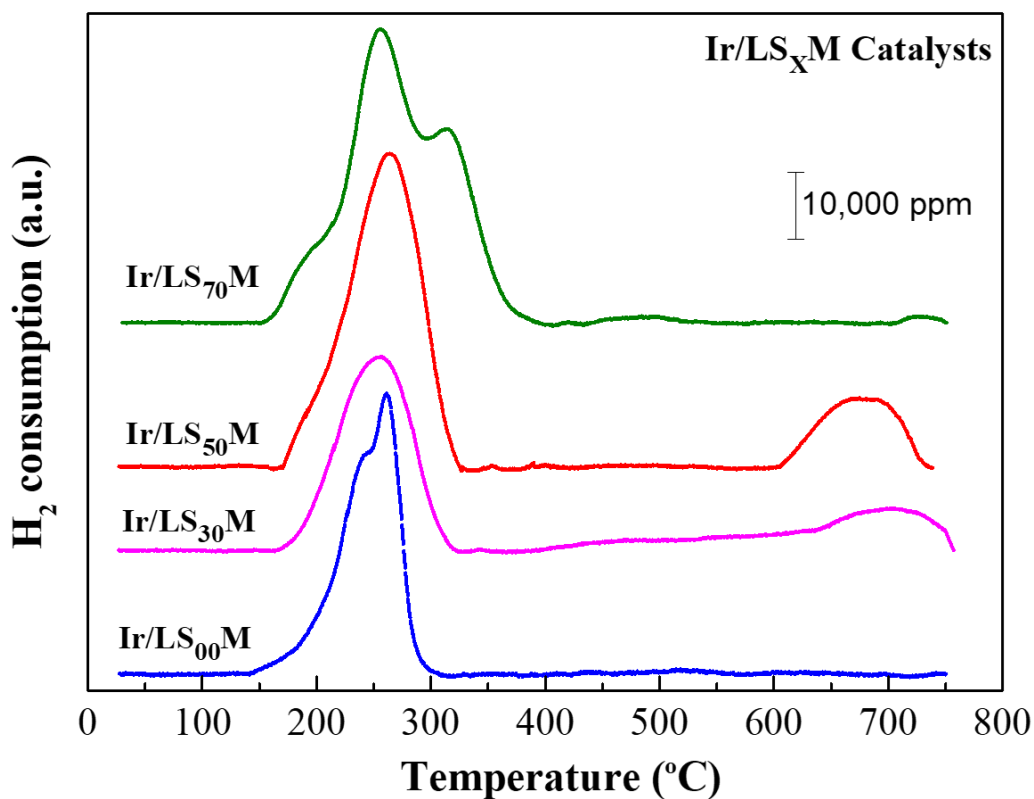


Figure S4. H₂ consumption versus temperature (H₂-TPR profiles) of Ir/LS_xM catalysts.

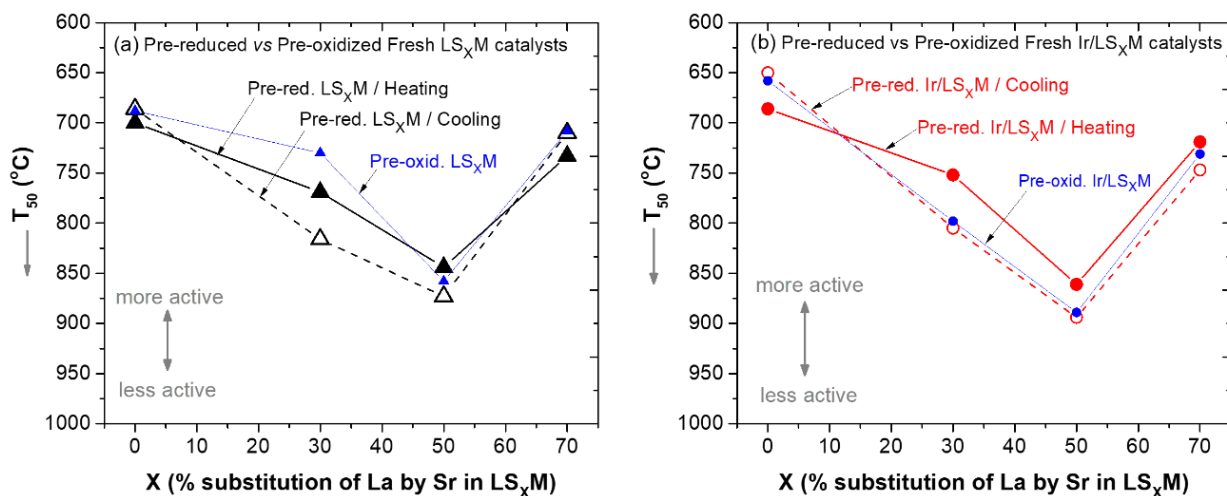


Figure S5. Dependence of T_{50} on X (% substitution of La by Sr in the perovskite composition) for pre-reduced and pre-oxidized LS_xM catalysts (a), and pre-reduced and pre-oxidized Ir/LS_xM catalysts (b). Feed conditions: 1.0% CH₄ + 5.0% O₂, He balance at 1atm, F_r =75 mL/min, m_{cat} = 50 mg, WGHSV=90,000 mL/g·h.

Supplementary Tables

Table S1. Temperature for 50% CH₄ conversion (T₅₀) of pre-oxidized and pre-reduced, *fresh* LS_xM and Ir/LS_xM catalysts.

Fresh Catalysts	T ₅₀ (°C) Pre-oxidized catalysts		T ₅₀ (°C) Pre-reduced catalysts	
	<i>Light-off (heating)</i>	<i>Light-out (cooling)</i>	<i>Light-off (heating)</i>	<i>Light-out (cooling)</i>
LS ₀₀ M	688	688	700	686
LS ₃₀ M	730	730	769	816
LS ₅₀ M	858	858	844	873
LS ₇₀ M	708	708	733	710
Ir/LS ₀₀ M	658	658	686	650
Ir/LS ₃₀ M	798	798	752	805
Ir/LS ₅₀ M	889	889	861	894
Ir/LS ₇₀ M	731	731	719	747

Table S2. Temperature for 50% CH₄ conversion (T₅₀) of pre-reduced and pre-oxidized LS_xM and Ir/LS_xM catalysts that were aged at 750 °C.

Aged@750 Catalysts	T ₅₀ (°C) Pre-oxidized catalysts		T ₅₀ (°C) Pre-reduced catalysts	
	<i>Light-off (heating)</i>	<i>Light-out (cooling)</i>	<i>Light-off (heating)</i>	<i>Light-out (cooling)</i>
LS ₀₀ M	681	681	699	687
LS ₃₀ M	838	838	813	840
LS ₅₀ M	897	897	877	898
LS ₇₀ M	717	717	737	727
Ir/LS ₀₀ M	657	657	687	653
Ir/LS ₃₀ M	842	842	769	830
Ir/LS ₅₀ M	912	912	895	913
Ir/LS ₇₀ M	752	752	715	751