Electronic Supplementary Material (ESI) for Catalysis Science & Technology.

Supporting information

Oxidative coupling of methane under microwave: Core-shell catalysts for selective C_2 production and homogeneous temperature control

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Table S1. Microwave power supplied to reach the set-point reaction temperature.

Temperature (ºC)	500	600	700	800	900
			Power (W)		
MgO@SiC	65	60	51	49	50
MgO-SiC	43	34	38	42	73
MgO@FeO4	16	17	20	30	31
MgO-Fe3O4	11	12	17	23	31

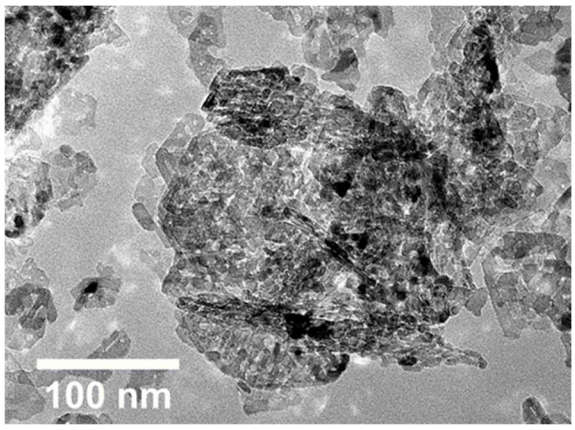

Figure S1. TEM image of Fe_3O_4@MgO catalyst.

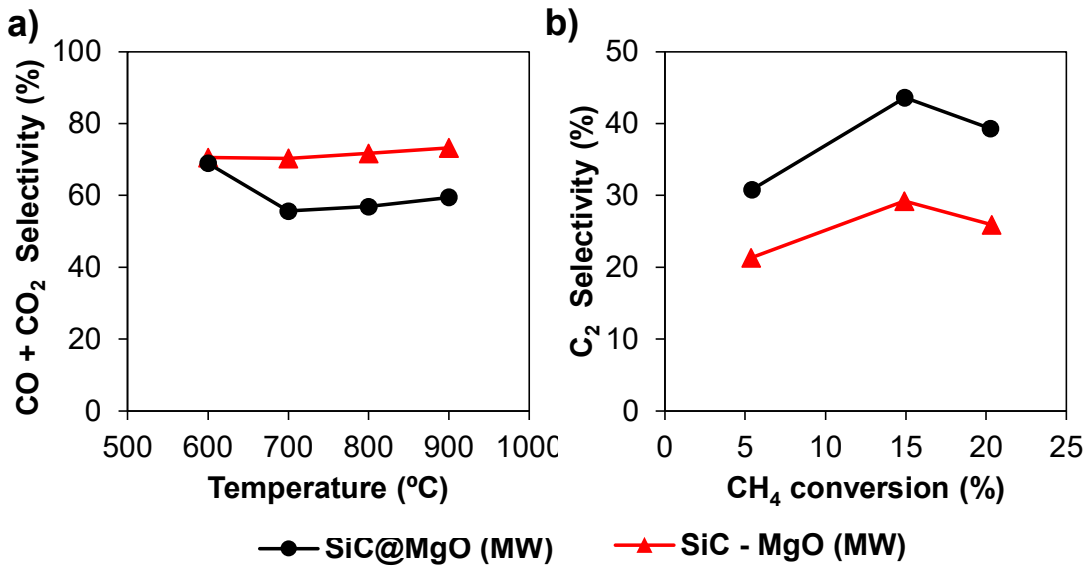

Figure S2. a) Total selectivity towards partial/deep oxidation products ($CO+CO_2$) as a function of the temperature; b) C_2 selectivity at different iso-conversion values for SiC@MgO and SiC-MgO, under microwave radiation conditions.

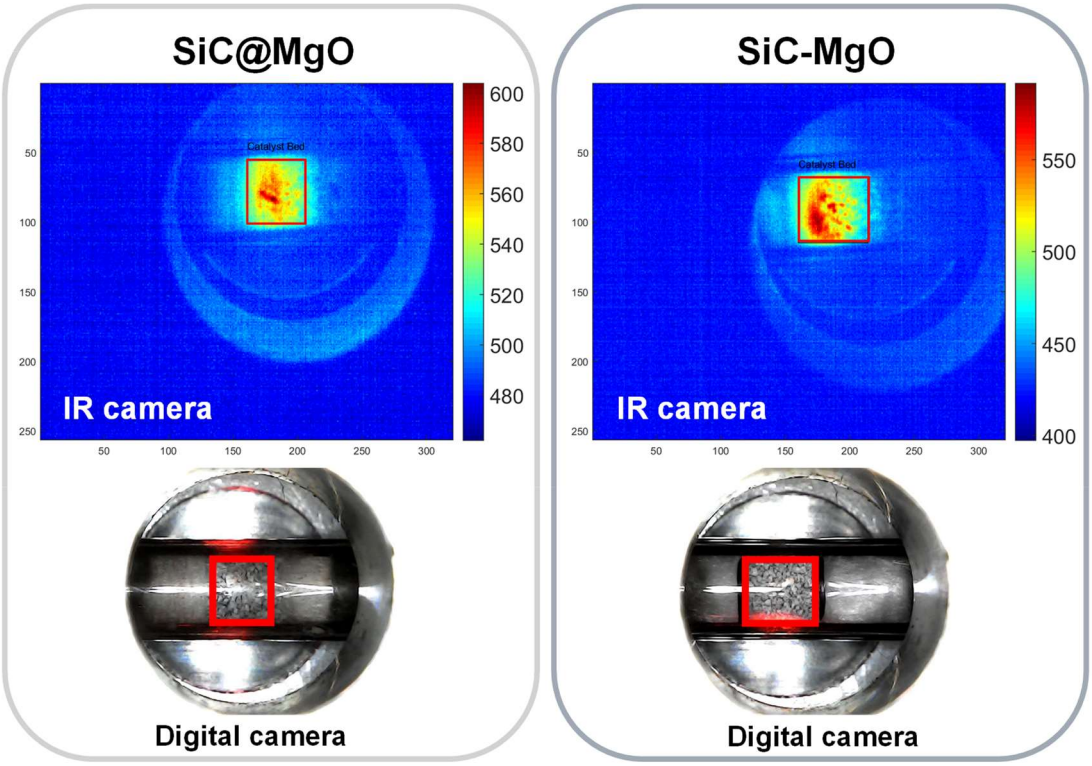

Figure S3. Catalyst bed digital microscopy and infrared thermography images of SiC@MgO and SiC-MgO during OCM reaction, under microwave radiation, at 500 ºC. Red square shows catalyst bed in the reactor tube. The red light reflected on the reactor wall is the focusing light from the infrared temperature sensor. The gas flow is from the right to the left of the reactor tube.

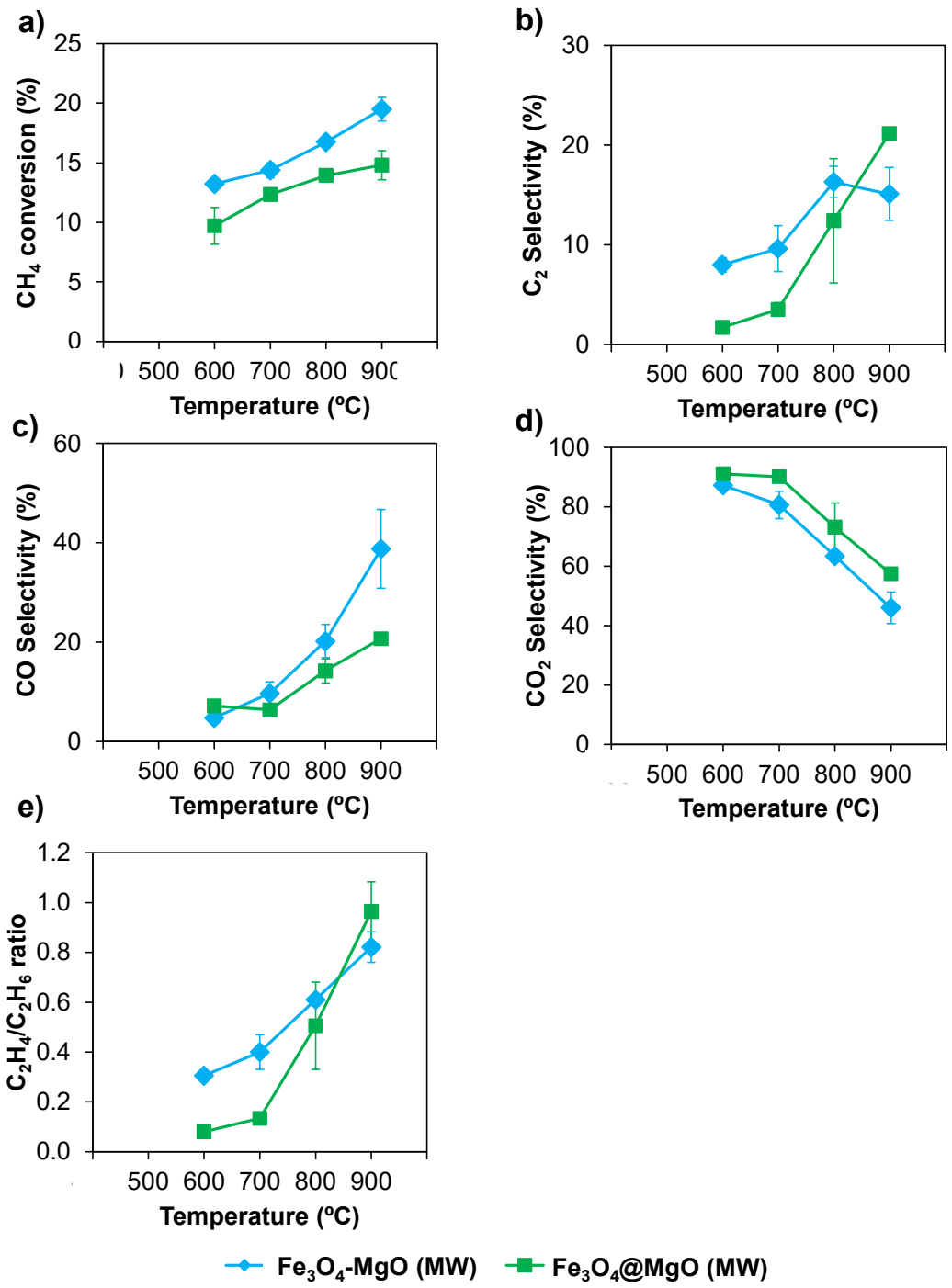

Figure S4. a) CH_4 conversion, b) C_2 selectivity, c) CO selectivity, d) CO_2 selectivity and e) C_2H_4/C_2H_6 ratio for Fe_3O_4@MgO and Fe_3O_4-MgO catalysts under microwave radiation (MW) conditions.

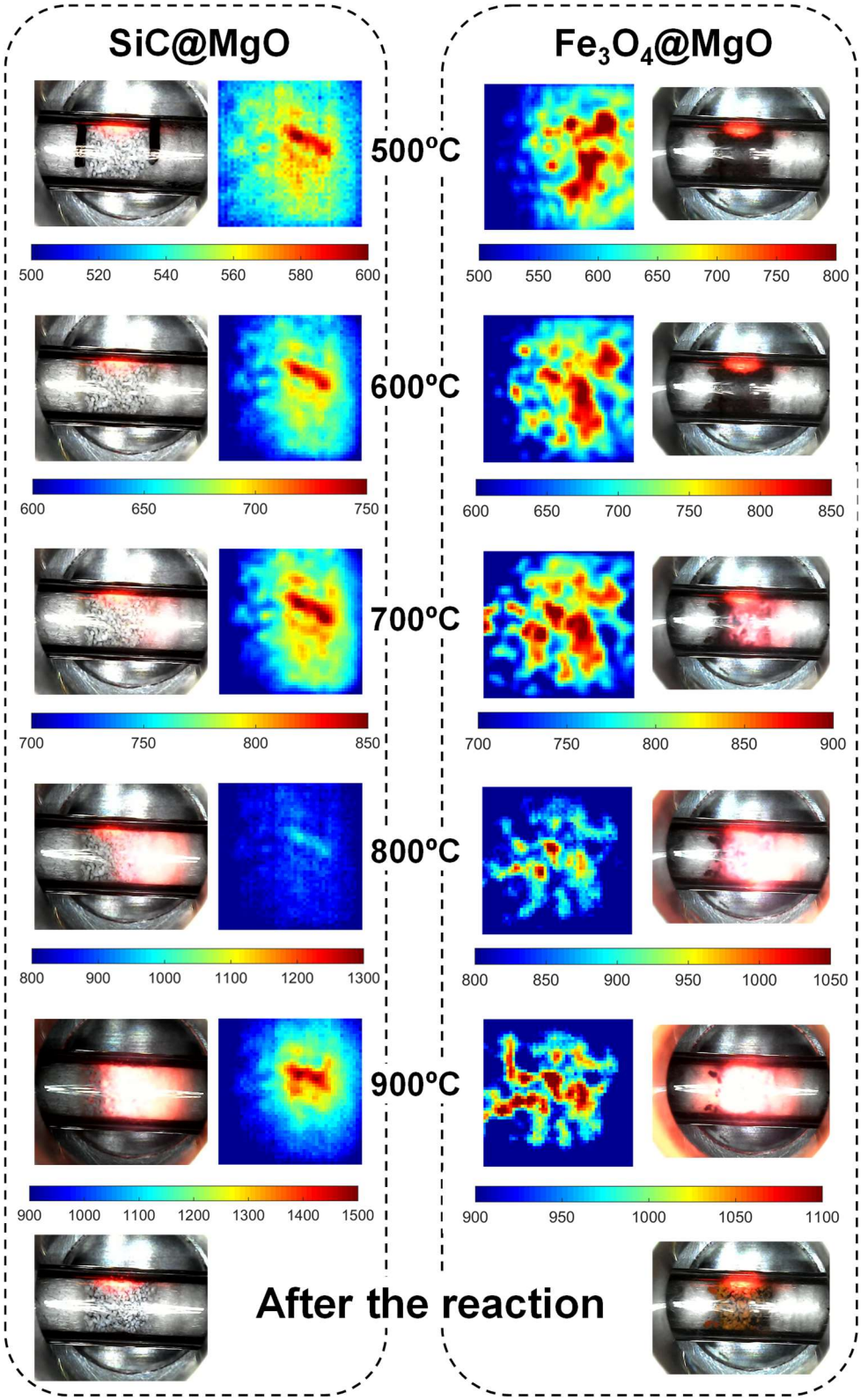

Figure S5. Digital microscopy images and temperature distributions during OCM, under MW, at different reaction temperatures for SiC@MgO and Fe_3O_4@MgO catalytic beds. The red light reflected on the reactor wall is the focusing light from the infrared temperature sensor. The gas flow is from the left to the right of the reactor tube.

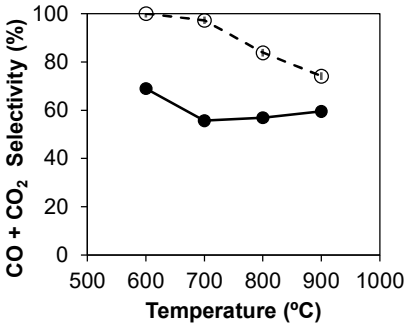

Figure S6. a) Total selectivity towards partial/deep oxidation products ($CO+CO_2$) as a function of the temperature for SiC@MgO under MW and RH conditions.

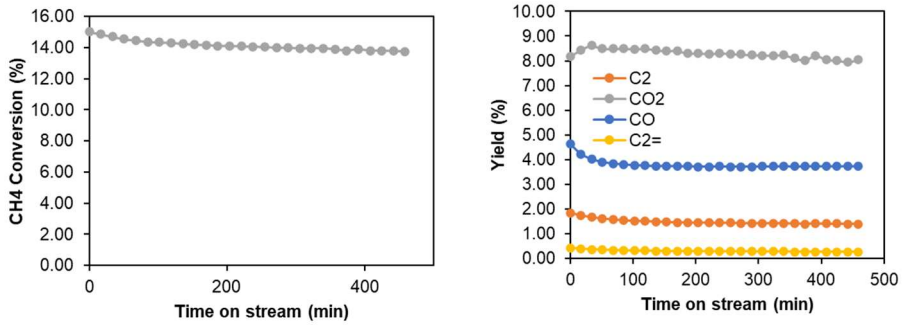

Figure S7. Reactants conversion and products selectivity as a function of time on stream at 750 ºC (RH), total flow = 150 mL min^{-1} (40% CH_4, 10% O_2), W_{cat}= 100 mg, W_{SiC} = 350 mg.

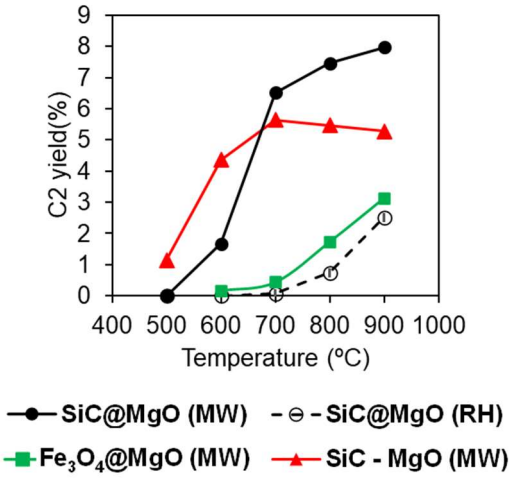

Figure S8. C_2 yield for Fe_3O_4@MgO, SiC@MgO and SiC-MgO catalysts under microwave radiation (MW) conditions, and SiC@MgO under resistive heating (RH) conditions.