# Electronic Supplementary Material

**Methane cracking in molten tin for hydrogen and carbon production—a comparison with homogeneous gas phase process**

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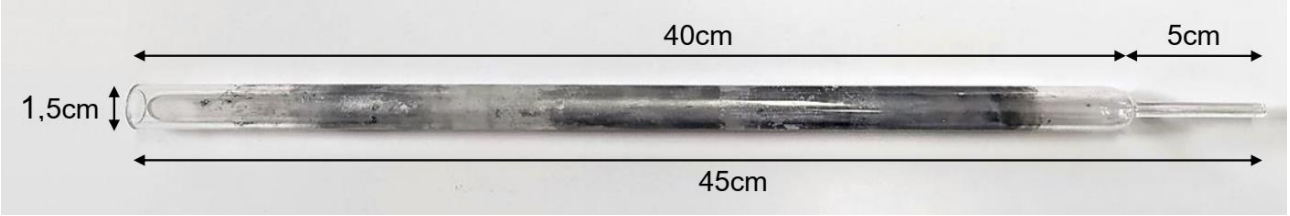



**Figure S1**. Sample of quartz reactor used for the experimental tests ($L_{TOT}$= 45 cm I.D.= 1,5cm)

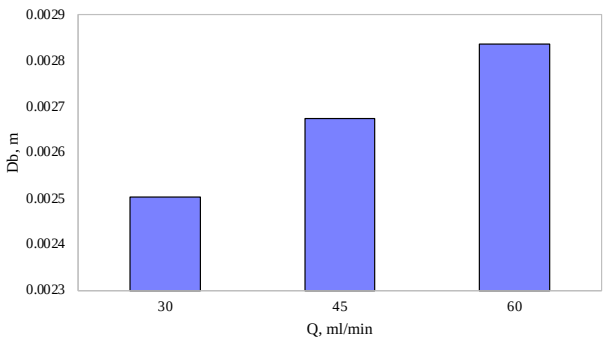



**Figure S2**. Bubble's diameter calculated at 1070 °C for the different inlet flow rates.

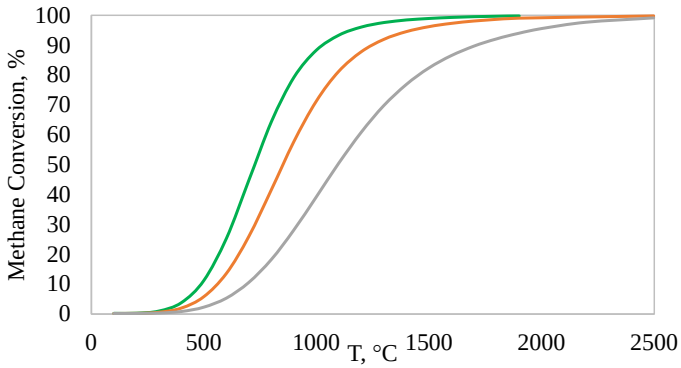
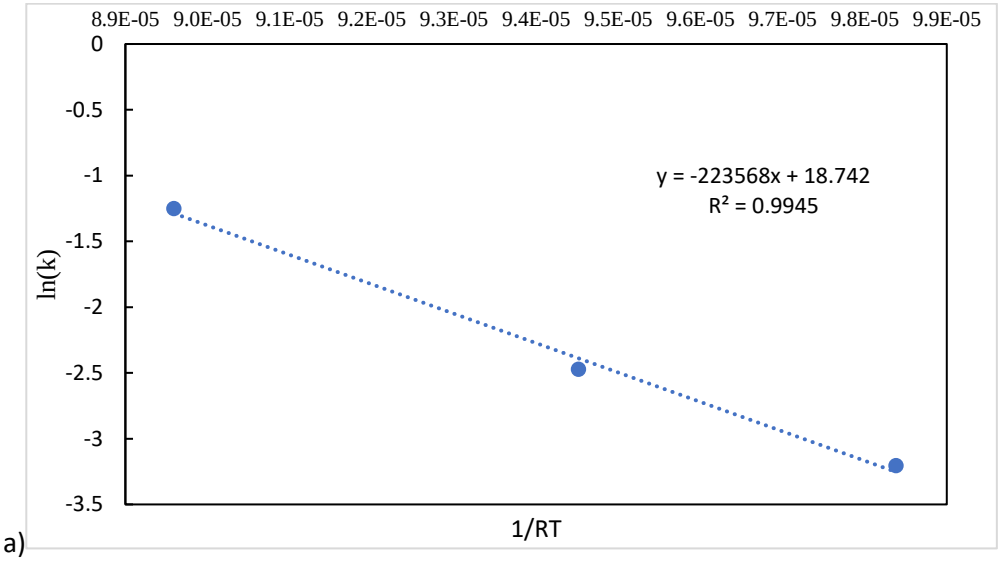
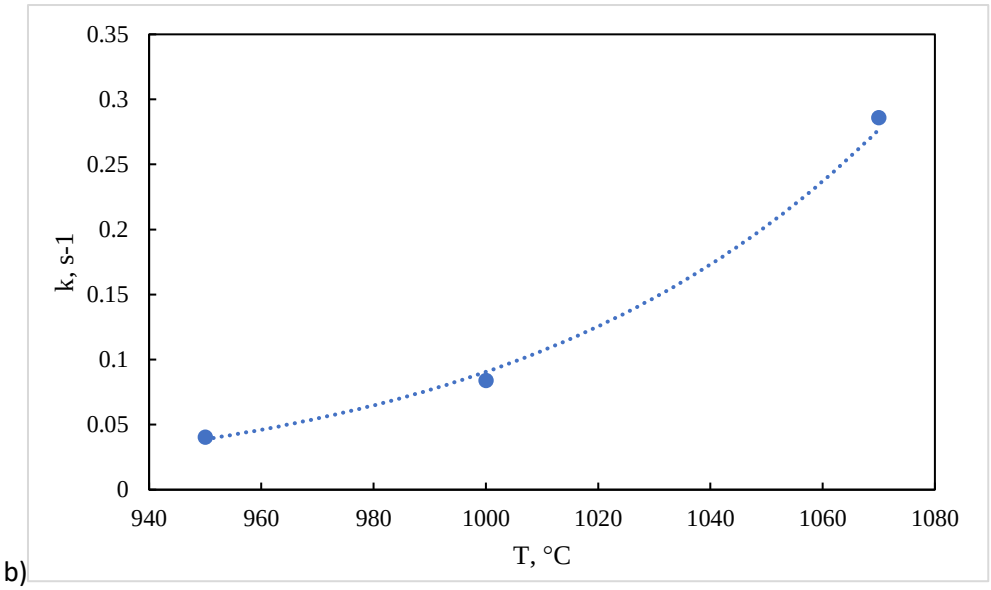



**Figure S3**. Equilibrium conversion of methane ($x_{CH4,0} = 1$) as a function of temperature and pressure (1 atm – green; 5 atm – orange; 50 atm – grey). Calculations executed in OpenSMOKE++[1].



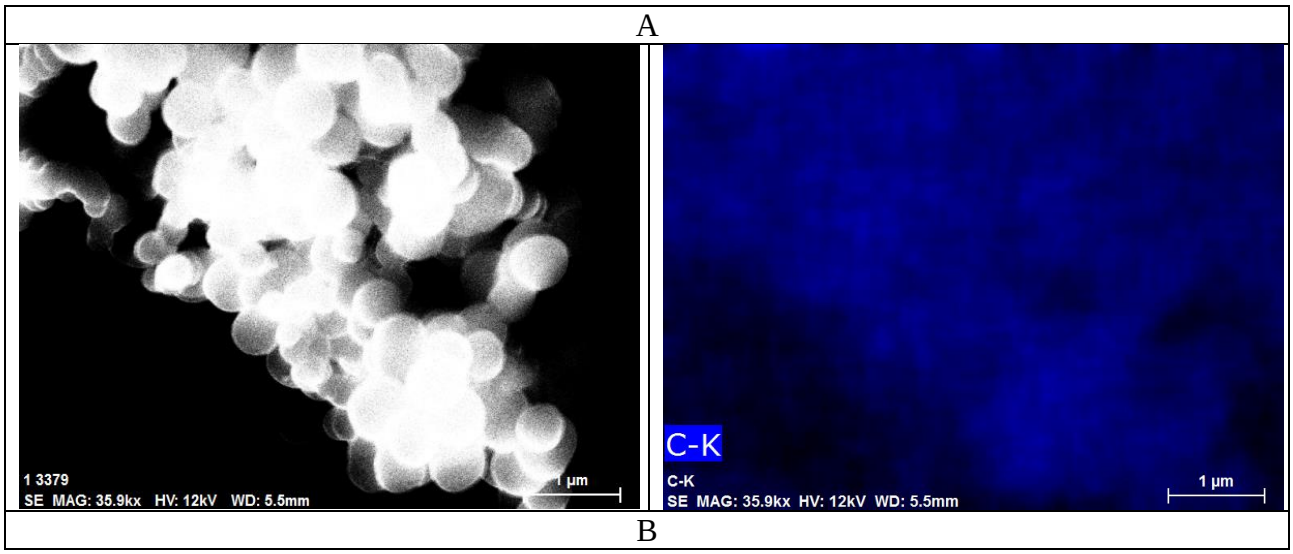

a)

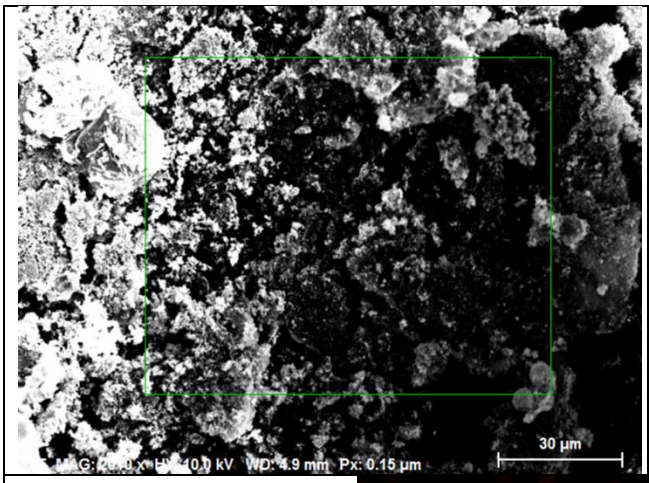
[1] Cuoci, A., Frassoldati, A., Faravelli, T., Ranzi, E., Computer Physics Communications, 192, pp. 237-264 (2015), DOI: 10.1016/j.cpc.2015.02.014

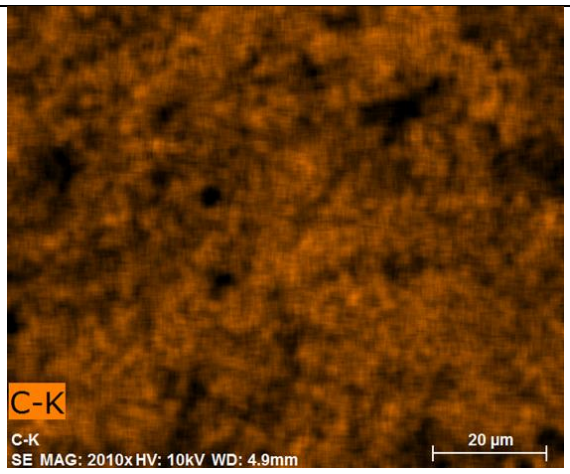


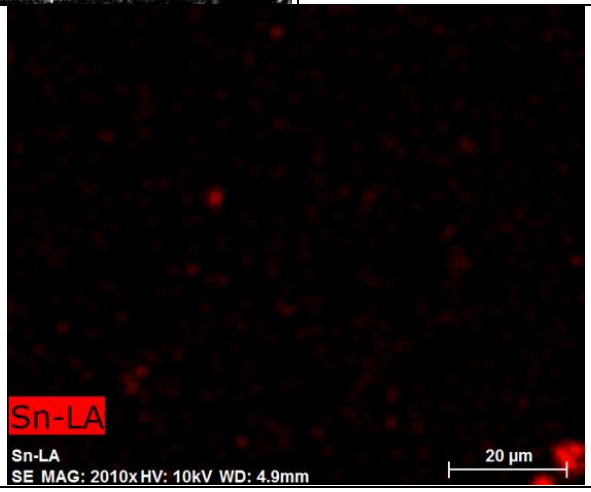

b)

**Figure S4**. Temperature dependance of ln(k) on 1/RT (a) and of k($s^{-1}$) on T(°C) (b)

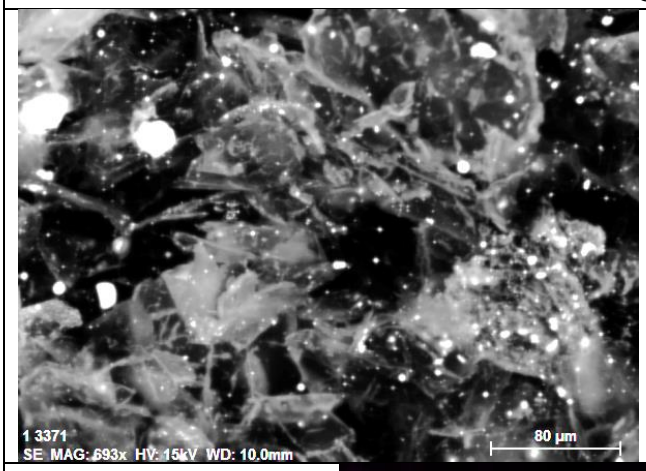


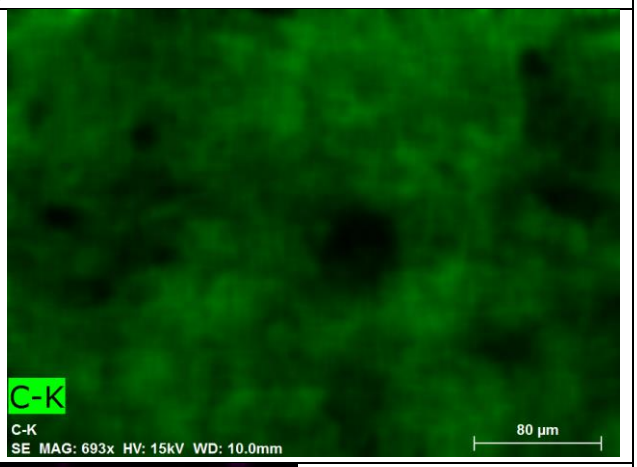

30 µm


C-K
C-K
SE MAG: 2010x HV: 10kV WD: 4.9mm
20 µm


Sn-LA
Sn-LA
SE MAG: 2010x HV: 10kV WD: 4.9mm
20 µm

C


1 3371
SE MAG: 693x HV: 15kV WD: 10.0mm
80 µm


C-K
C-K
SE MAG: 693x HV: 15kV WD: 10.0mm
80 µm


Sn-LA
Sn-LA
SE MAG: 693x HV: 15kV WD: 10.0mm
80 µm

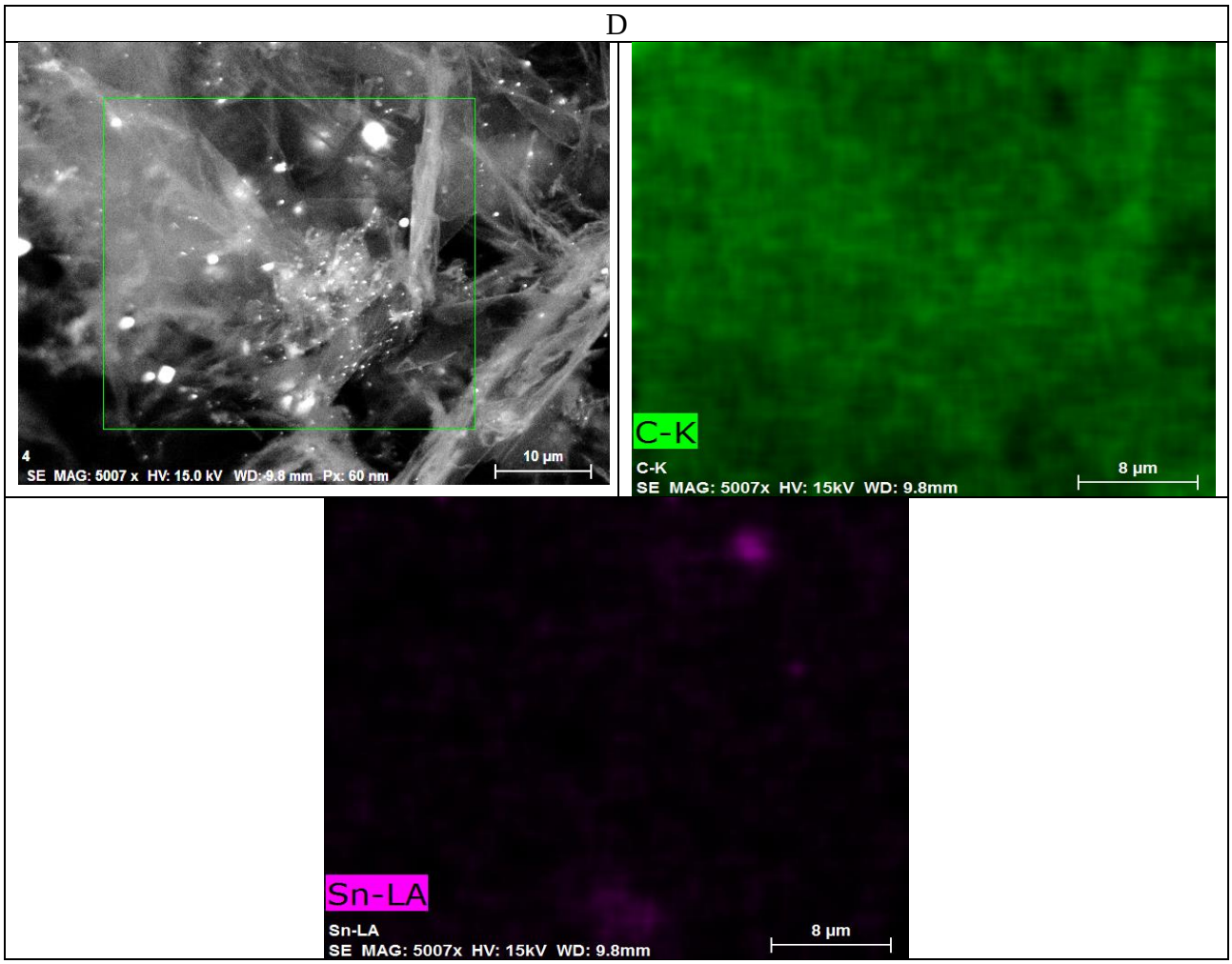



**Figure S5**. SEM/EDS pictures of the carbons obtained A) in empty reactor B) for HTIN= 7 cm C) for HTIN = 15 cm.