

Supplementary Information

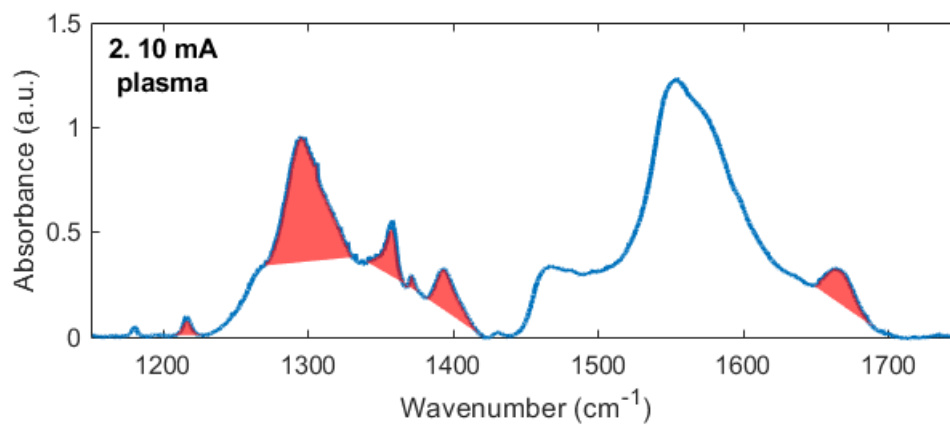


Figure S1: Example of areas extracted (shown in red) from the infrared spectrum from 1100 - 1800 cm⁻¹ in the final spectrum from 10 mA plasma step in 70% CO₂-30% CH₄ initial gas mixture at 1 Torr. The bands displayed are: HC: 1218 and 1396 cm⁻¹, TC: 1294 cm⁻¹, F: 1360 and 1370 cm⁻¹ and band 1665 cm⁻¹.

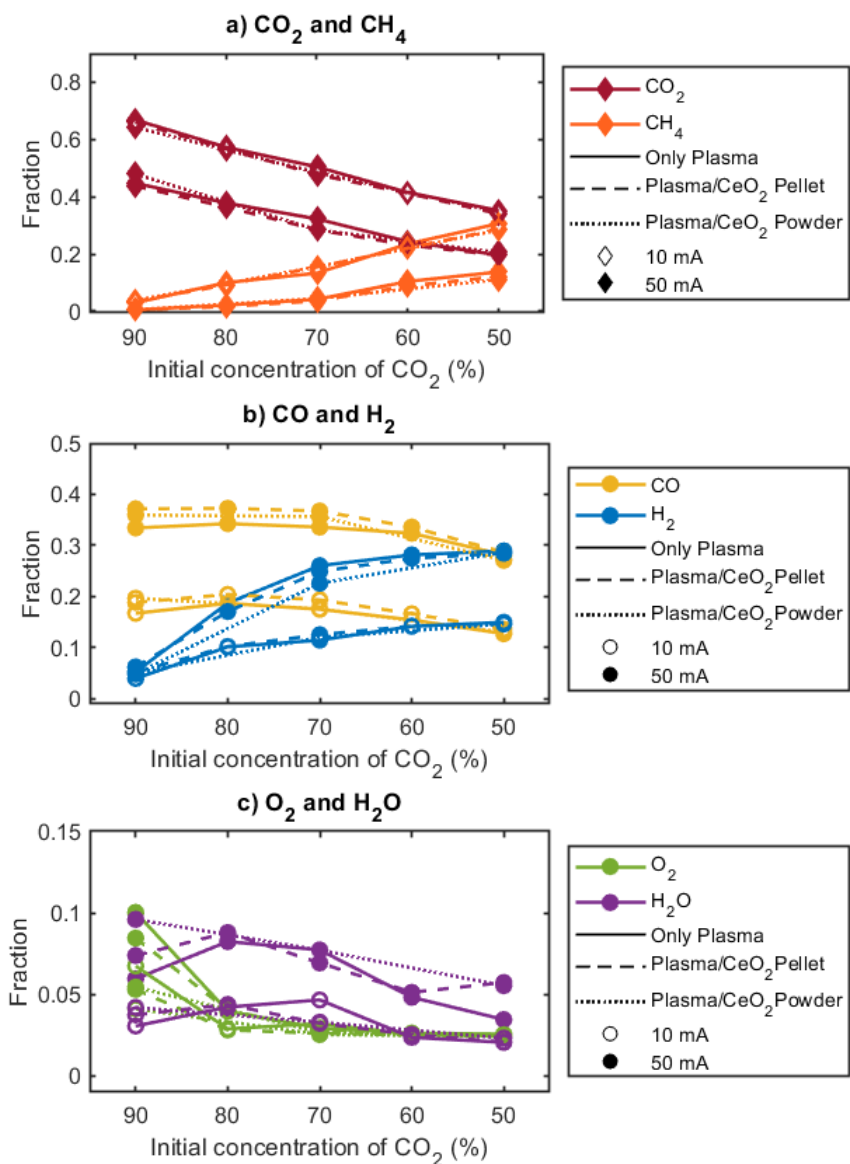


Figure S2: Carbon dioxide and methane (a); carbon monoxide and hydrogen (b); and oxygen and water (c) fractions measured in downstream gas from CO₂ and CH₄ plasmas at different concentrations at 1 Torr for 10 and 50 mA plasma current.

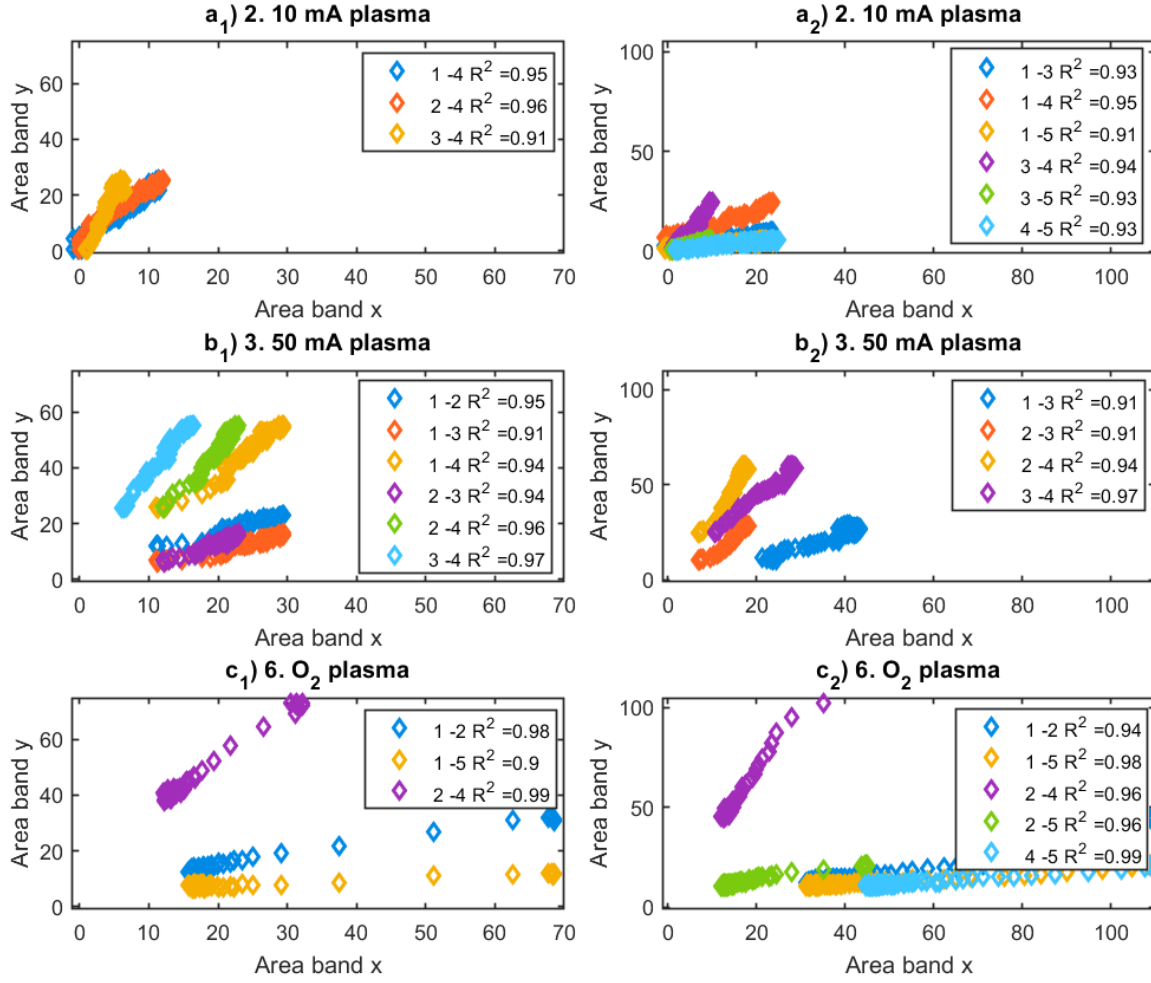


Figure S3: Correlation of bands x vs y during *in situ* transmission experiments for 70%CO₂-30%CH₄ at 1 Torr (a₁, b₁ and c₁) and 5 Torr (a₂, b₂ and c₂). Numbers are assigned to a specific band: 1 = 1358 cm⁻¹, 2 = 1370 cm⁻¹, 3 = 2722 cm⁻¹, 4 = 2845 cm⁻¹ and 5 = 2933 cm⁻¹. Coefficient of determination R^2 is shown for every band correlated with more than 0.9.