

ON THE EVALUATION OF THE MACROALGAE SARGASSUM SP. THROUGH DIFFERENT PYROLYSIS TECHNOLOGIES TO OBTAIN BIO-FUELS AND OTHER USEFUL MATERIALS

L. Taboada-Ruiz¹, E. Ciurcina¹, P. Álvarez¹, B. Ruiz¹, M. Díaz Somoano¹, M. Granda¹, Z. González¹, U. Sierra², Rebeca Betancourt Galindo²

¹Instituto de Ciencia y Tecnología del Carbono (INCAR), CSIC, C/ Francisco Pintado Fe, 26, 33011, Oviedo, Spain

²Centro de Investigación de Química Aplicada (CIQA) Laboratorio Nacional de Materiales Gráficos, Boulevard Enrique Reyna 140, San José de los Cerritos, C.P. 25294 Saltillo (Coahuila), México



Introduction

- This study the case of Sargassum sp., a brown macroalgae with unusual bloom, which can cause severe environmental problems, particularly in the Caribbean.
- In an effort to address the Sargassum problem this work focused on their utilization as raw material for bio-oil, bio-char and gas generation.
- The pyrolytic conversion of biomass into bio-fuel is one of the most promising alternatives to fossil fuels for energy production. It also addresses environmental concern motivated by the use of urban wastes.

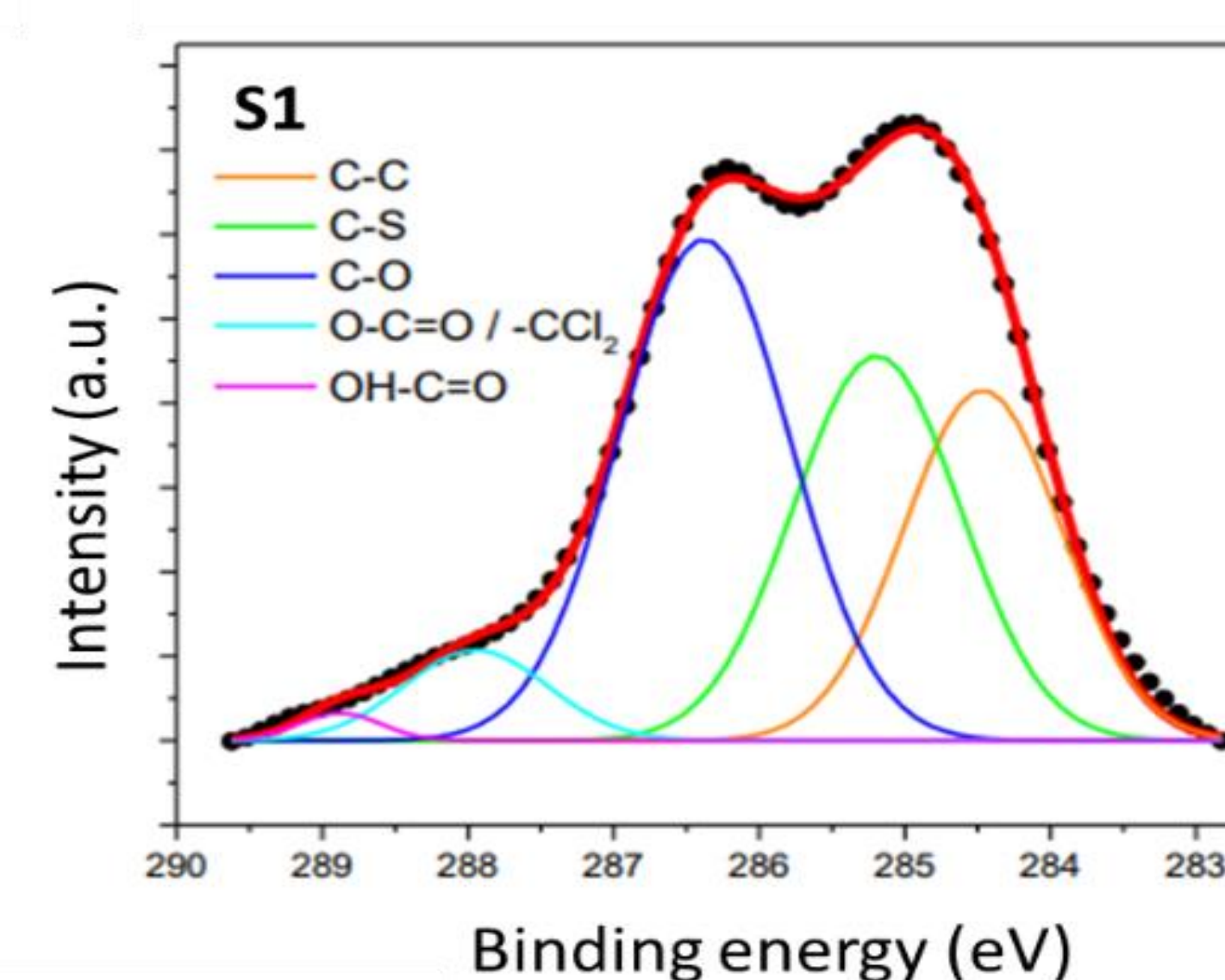
Results & Discussion



Table 1: Atomic composition of the Sargassum sp.-based samples S1

Element	S1
C	62.1
O	25.2
Na	2.3
Cl	6.0
S	0.8
K	3.6
Ca	---

Figure 1: XPS C1s analysis of S1



CONVENCIONAL PYROLYSIS (CP)

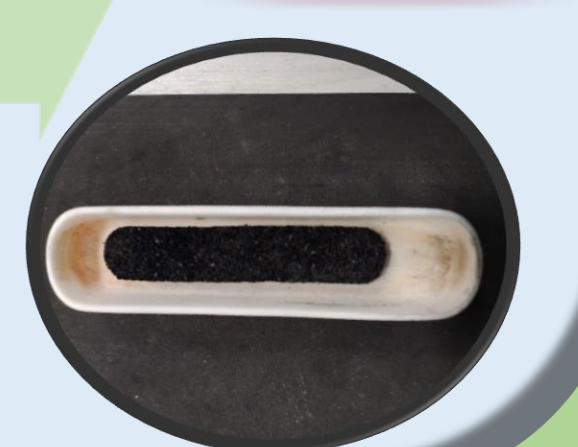


25 °C/min
500 °C

GAS

BIO-OIL

BIO-CHAR



Pyrolysis yield of Bio-char, bio-oil and gas

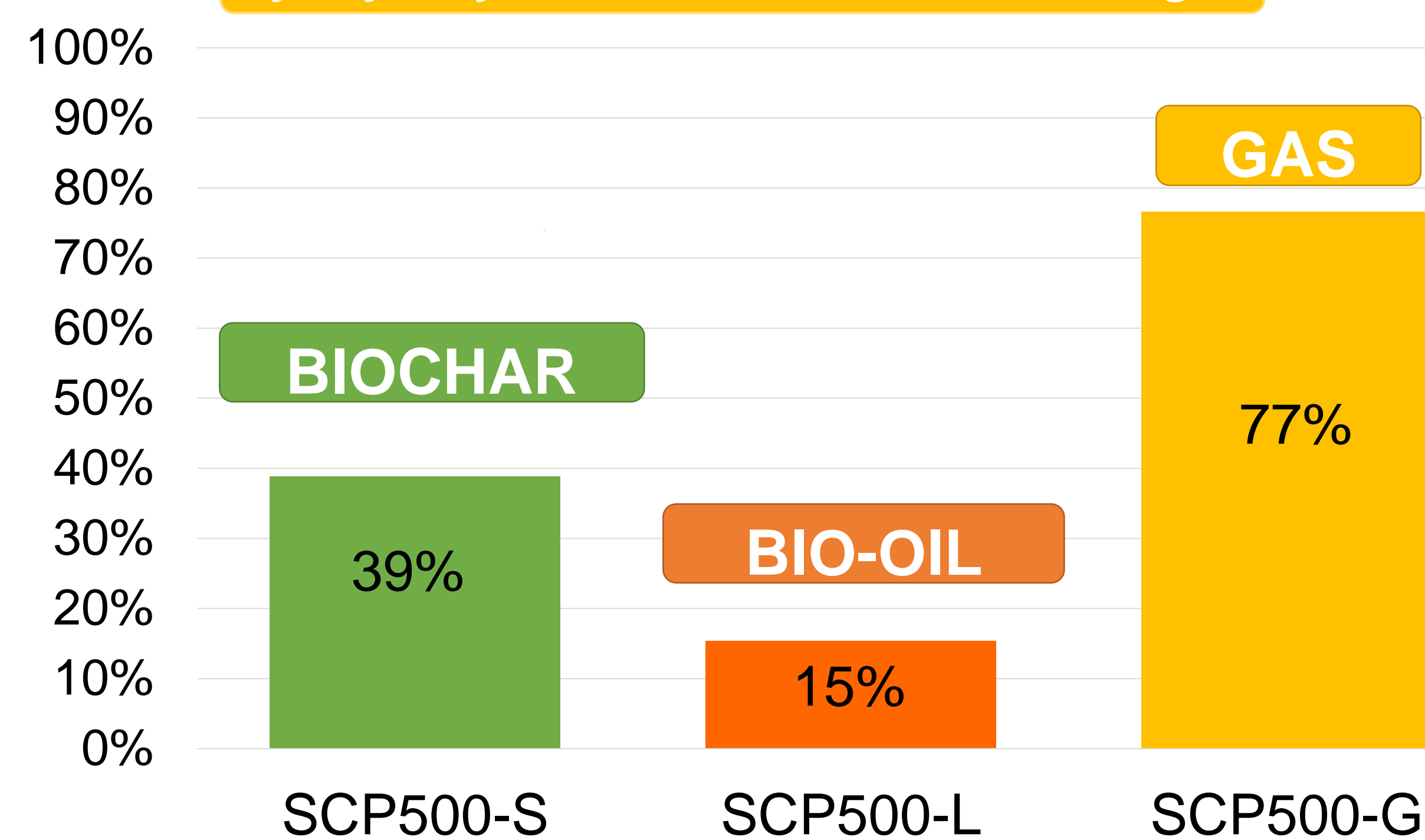
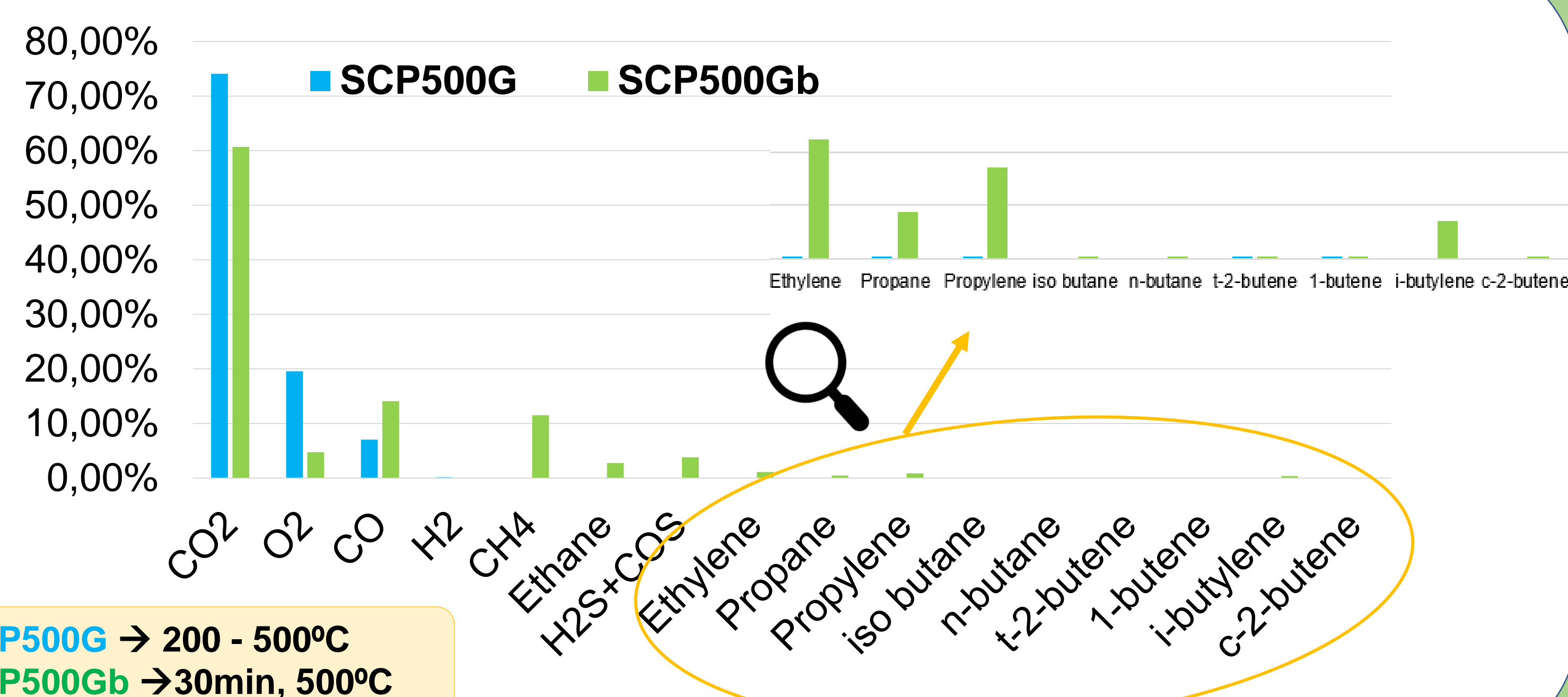


Table 2: Chemical characterization of Bio-char

SAMPLE	C (%)	H (%)	N (%)	S (%)	O (%)
SCP500-S	55.0	2.4	1.1	2.4	39.1

GAS COMPOSITION



Conclusions

- Pyrolysis favoured the formation of Gas (yield of 77%).
- Chemical characterization of the bio-char showed a carbon material with high sulphur content (2,4%), it could not be suitable for combustion processes.
- Gas obtained at 500°C presented a high CO₂ content (>60%vol.) and low contents of fuel gases (CH₄, H₂, ethane, etc), so, its calorific value is low.
- Conventional pyrolysis bio-oil had a dominant monoaromatic hydrocarbons nature