Characterization of coal char by Raman microspectroscopy before and after acid leaching

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Introduction

One char concentrate (CC) with a carbon grade of 71.86 wt. % Fixed Carbon ($FC_{d.b.}$) was obtained from the fly ash of the 1st row of the electrostatic precipitator of PEGO power plant (Portugal) after a sequence of procedures consisting of dry sieving, sink-float with water, wet sieving, dry impaction, water vortex suspension and magnetic separation. This concentrate was then demineralized via a sequence of HCl and HF leaching and a demineralized char concentrate (CD) with a carbon grade of 97.60 wt. % $FC_{d.b}$ obtained.

Char particles from both char concentrates were then analyzed via Raman microspectroscopy to assess the influence of leaching on the char structure. The analysis was made via a Horiba Labram Dilor-Jobin Yvon spectrometer attached to an Olympus microscope and an excitation of 633 nm lines of a He-Ne laser. Five Raman spectra were recorded and Raman parameters calculated for each sample following the procedure described in Guedes et al. (2012).

The results obtained on both samples reveal from the CC to CD a narrowing of the FWHM of G band and an increase in the $ID/I(G_r+V_l+V_r)$ ratio indicating a slight increase in the structural ordering from CC to CD.

References

Guedes, A., Valentim, B., Prieto, A.C., Noronha, F., 2012. Raman spectroscopy of coal macerals and fluidized bed char morphotypes. Fuel 97, 443-449.

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