

Obtaining graphene oxide from high-rank Colombian coal using Liquid Phase Exfoliation (LPE) method

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Abstract

This document describes results obtaining coal dust for use it to synthesize graphene materials using Liquid Phase Exfoliation (LPE) process [1], starting from a sample of semi anthracite coal from Colombia. **The objective of this project is to know if changing the process to obtain coal dust changes the yield of graphene oxide.** The change will take place in two aspects: size selection [2] and removal of mineral matter from coal dust samples [3]. A protocol to adjust samples and size range measurement was designed to compare milling performance and size distribution. A sample of semi anthracite coal was taken from the mine and processed to achieve a particle size suitable to synthesize graphene materials. Industrial equipment was used for the first part of the milling process and a ball mill available at the Faculty of Engineering of the Universidad Nacional de Colombia was used to obtain coal dust. Researchers compared the yield of graphene materials through the LPE process in three different particle sizes of coal dust (0,15 to 0,09 mm, 0,09 to 0,05 mm and 0,05 to 0 mm). They also compare the yield of graphene materials through the LPE process after the removal of mineral matter from coal dust samples. For the LPE process it was used Pluronic 123 to facilitate the exfoliation of graphene oxide flakes.

References

- [1] J. G. Speight, *The Chemistry and Technology of Coal*, New York: CRC Press, 2013.
- [2] M. P. F. M. L. e. a. Coroş, « brief overview on synthesis and applications of graphene and graphene-based nanomaterials,» *Front. Mater. Sci.*, n° 13, pp. 23-32, 2019.
- [3] P. P. B. K. S. M. S. S. K. P. B. D. Meshram, «Demineralization of low grade coal - A review,» *Renewable and Sustainable Energy Reviews*, vol. 41, pp. 745-761, 2015.

Figures

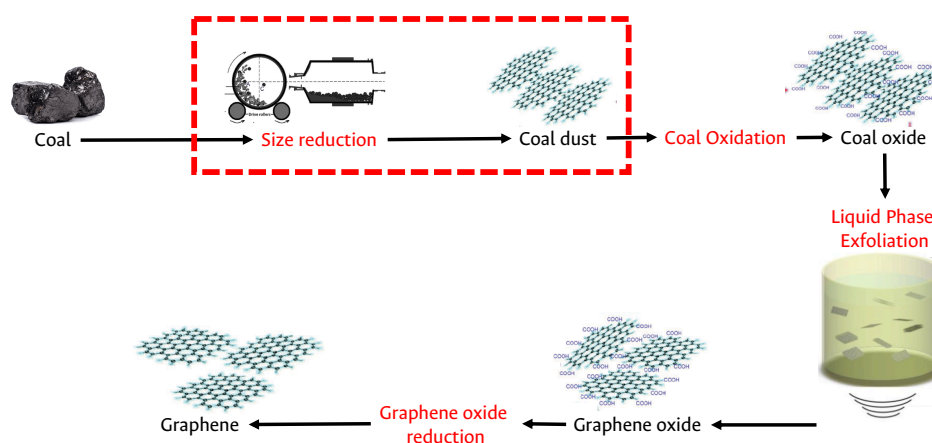


Figure 1: Scheme of LPE method to obtain graphene from coal