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GRAPHENE OXIDE BEHAVIOUR AT AIR-LIQUID INTERFACE

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RESUMO

Few studies deal with preparing and characterizing monolayers of 2D nanomaterials at the air-liquid interface. In this sense, in the present study, we conducted experiments at the liquid-air interface to understand the interfacial behavior of commercially available graphene oxide (GO). For this, GO dispersion was spread on the aqueous subphase surface by electrospray in a Langmuir trough (KSV NIMA, Finland). The monolayer surface pressure (π) and potential (ΔV) were monitored under trough area (A) compression. The π x A isotherm revealed π close to zero, from the beginning of compression to about 60% of the swept surface area (gas phase). Additional barrier advance promotes an abrupt increase in π, representing the monolayer liquid-expanded phase, observed in the $0 < \pi < 36$ mN/m. In parallel, the ΔV x A isotherm demonstrates changes in the structure of the monolayer before the beginning of surface pressure increase. ΔV only starts to increase at a given critical area (relative area of ~53 %), and it is associated with a decrease in the local dielectric constant at the monolayer/water interface as the film becomes structured1. Also, the ΔV x A isotherm reveals the beginning of the monolayer collapse in the relative area of ~73 % when ΔV reached the maximum value of 0.25 V. At this point of compression, ΔV data reveals the beginning of monolayer rupture, so further compression causes a sharp decrease in its value.On the other hand, GO monolayer collapse was observed at the relative area of 85% for the π x A isotherm. These finds can help choose the best conditions for preparing Langmuir-Blodgett films for technological applications. Also, the data constitute basic information for understanding the behavior of 2D materials at the air-liquid interface.

PALAVRAS-CHAVE: Langmuir Monolayer, graphene oxide, 2D nanomaterials

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