# Bipolar electrochemistry for functionalization of 2D materials

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After the isolation of graphene monolayer graphene 2D materials have garnered great attention for their theoretically predicted exceptional properties. Covalent functionalization strategies are used to further finetune and improve these properties, which allow to integrate these materials into a wide range of applications. However, these strategies need highly reactive conditions, which do not guarantee a control over the degree and homogeneity of functionalization of the surface. Moreover, existing methods do not allow the functionalization of non-conductive surfaces and not much work has been done on 2D materials besides graphene. Additionally, there is a need in obtaining these 2D materials in a scalable fashion to be viable for industrial application. In this work we propose a scalable, low cost, facile method to achieve both exfoliation and functionalization in one-pot using bipolar electrochemistry for the production of 2D material in dispersions. Bipolar electrochemistry applies a high voltage to the electrolyte cell, and a gradient of the electric field occurs over the cell which induces the polarization of material placed between two electrodes. The polarization drives simultaneous reduction and oxidation reactions at the opposite poles of the placed material. This opens possibilities of functionalization of inert and semiconductor materials. The material is characterized with a range of techniques including Raman, AFM and TEM.

## References

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## Figures

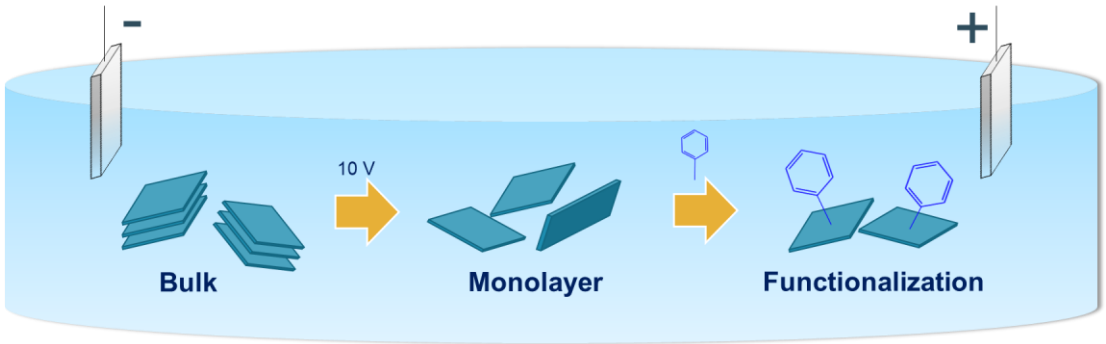


**Figure 1:** Schematic of the one-pot exfoliation and functionalization bipolar approach.