chem2Dmat
European Conference on Chemistry of Two-Dimensional Materials

Arginine-modified graphene oxide for Carbon dioxide fixation

A. Pintus[a-b], S. Mantovani[a], A. Kovtun[a], G. Bertuzzi[c], M. Bandini[c], M. Melucci[a].
[a]Institute for Organic Synthesis and Photoreactivity (ISOF), National Research Council of Italy (CNR), Via P. Gobetti 101, I-40129 Bologna, Italy.
[b]Department of Physics, Informatics and Mathematics, Università degli Studi di Modena e Reggio Emilia, via Giuseppe Campi, 213/a 41125 Modena, Italy.
[c]Dipartimento di Chimica, "Giacomo Ciamician" Alma Mater Studiorum – Università di Bologna, via Selmi 2, 40126 Bologna, Italy.
angela.pintus@isof.cnr.it

The catalytic transformation of CO_2 into value-added organic compounds is matter of growing interest in organic chemistry.[1] A variety of catalytic systems have been explored, but the development of an environmentally benign, heterogeneous catalyst that is highly active at mild conditions remains challenging.[2] Due to its large surface area and chemical versatility,[3] Graphene oxide (GO), has received extensive attention as nanostructured carbon-based catalyst.[4]
In this work, we report on the synthesis and characterization of covalently modified GO with L-Arginine (GO-Arg) and on its use as CO_2 fixation substrate and carbocatayst.[5] GO-Arg was synthesized by epoxide ring opening reaction, purified by microfiltration and characterized by X-ray photoelectron spectroscopy and elemental analysis to measure the amino acid loading. GO-Arg nanosheets were then exploited as catalyst for chemo selective ring-opening of epoxides and conversion to cyclic carbonates under mild operating conditions on several different substrates (up to 15). High yields (up to 85 %), regeneration and reuse up to 5 cycles have been achieved and will be here reported.

References

[1] M Aresta et al., Dalton Trans. (2007), 2975-2992.
[2] X. Zhang et al., Front. Energ. Res. (2021), 8, 621119.
[3] S. Khaliha et al., Environ. Sci.: Water Res. Technol. (2023).
[4] L. Lombardi et al., Chem. Eur. J. (2022), e20220033
[5] A. Pintus et al., Chem. Eur. J. (2023), 29, e202202440.

Figures

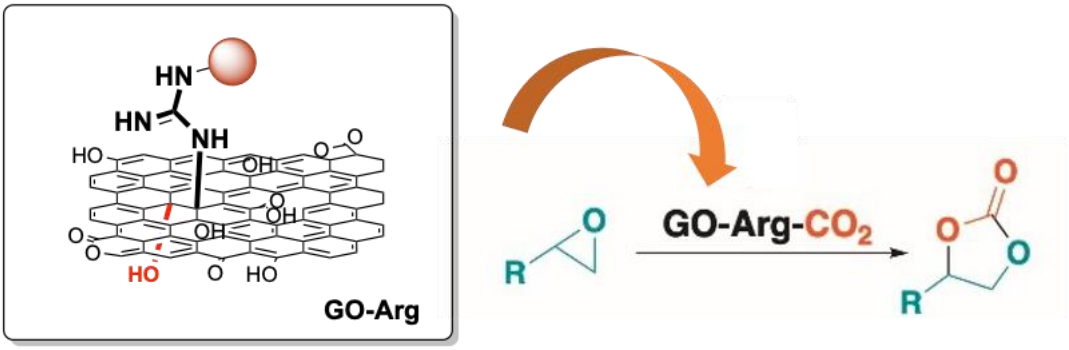

Figure 1: Nucleophilic activation of carbon dioxide by the guanidine group of GO-Arg.