

Large Scale Production and Industrialization of Graphene Oxide

Stephanie H. Santos¹

Rune Wendelbo¹, Kaiwen Hu², Robert-Eric Gaskell²

¹Abalonyx AS, Forskningsveien 1 0370, Oslo, Norway

²ORA Graphene Audio 780 Av. Brewster RC-016, Montreal, Quebec, H4C 2K1, Canada

shs@abalonyx.no

Graphene oxide (GO) has been studied and tested for diverse applications for several years. Now, these years of work are taking GO from the laboratory to the industry. Up-coming applications comprise such diverse fields as energy storage, membrane design, corrosion protection, water remediation, composites and coating of certain electronic components. As a result, reliable production is required to cover the demand of high-quality GO in the market.

Abalonyx has worked with GO production and development of GO derivatives for 12 years. We have developed a scalable, safe and cost-effective process, and current production capacity is 1 kg/batch, but we now see increased demand and need for scale-up. Thus, we are now installing a new 3 kg/batch reactor and have ready plans for 6kg/batch in a fully automated production facility, see Figure 1. Also, we are registering for REACH to be ready to produce up to 10 tons/year. Our ambition is to become Europe's largest certified supplier of graphene oxide by offering high-quality and reproducible materials, competitive prices and ability to supply industrial end-users.

In response to special needs from customers we have developed a range of derivative products including deacidified and basic GO, partly and fully reduced graphene oxide (rGO), rGO, nitrogen doped GO and rGO, films, aerogels and pillared GO and rGO. In addition, we have been working extensively in quality control and HSE-issues as we are aware these aspects are fundamental to industrial end-users for the eventual successful commercialization of a product.

One of the most promising applications we are working on is in collaboration with our Canadian partner, ORA Graphene Audio. ORA is developing the (GQTM) membranes that have been already tested and are under test production now. Membranes made with Abalonyx' GO show superior Young's modulus, damping and lower density, to conventional acoustic diaphragm materials. As a result, the performance of these membrane in loudspeakers show a 50% improvement in frequency response, up to 70% increase in battery life and 25% improvement in power handling over the current state-of-the-art technology.

FIGURES



Figure 1: 3-D model for 6 kg/batch production of graphene oxide at Abalonyx's production site.