Editorial corner – a personal view

Expressing polymers for a sustainable development

A. Pegoretti*

University of Trento, Department of Industrial Engineering, Via Sommarive 9, 38123 Trento, Italy

The dominant model of the last two centuries in terms of materials managements was based on the sequence *take – make – use – dispose* with focus on the economic growth regardless the way materials were used or what happened to them at the end of product life. Today, with a global population exceeding seven billion and continuing to rise, this model is no longer sustainable. In fact, the eco-system has limited capacities to cope with the pressure placed on it and, concurrently, the increasing complexity of the products has generated a dependence on ‘critical raw materials’ whose availability and accessibility is rapidly decreasing. At an academic level, the awareness of the importance of a sustainable development is reflected by the increasing number of courses introduced by Universities incorporating concepts of sustainability into engineering, materials and design programs (ISBN: 978-0-08-100176-9).

The development of more sustainable engineering materials largely depends on the efforts of researchers acting in both academy and industry. Research in polymer science and technology certainly might have a relevant role in this path. New ideas are needed for a larger use of materials produced from renewable resources and/or with a lower environmental impact. For example, as reported in a recent editorial corner in this Journal (<https://doi.org/10.3144/expresspolymlett.2017.57>), the high interest for the potential use of ‘green’ composites in automotive applications is pushing the development of more environmentally friendly and recyclable natural/bio-fiber composites. New opportunities can also come from a clever usage of wood or wood derivatives products. Micro- and

nano-cellulose can be used to efficiently reinforce various polymeric matrices, including biodegradable ones (<https://doi.org/10.3144/expresspolymlett.2017.26>), or to improve the properties of structural composites (<https://doi.org/10.3144/expresspolymlett.2017.6>). With the existing technology, ultrathin (less than 200 microns) wood laminae can be obtained in a relatively inexpensive way and used to obtain fully biodegradable and thermo-formable laminates by coupling them with suitable thermoplastic matrices in an approach similar to the hand lay-up technique. The feasibility of this approach has been recently proven with a biodegradable matrix such as polyvinyl alcohol (<https://doi.org/10.1002/pc.24040>).

A ‘sustainability-oriented’ polymer research can also contribute to a more efficient energy management, as it can be easily understood from a couple of examples recently published in this Journal: electrical energy can be harvested and stored by a proper integration of engineered polymer blends or nanocomposites embedded in wearable connected devices (<https://doi.org/10.3144/expresspolymlett.2017.65>), while thermal energy can be stored and released in highly flexible polymer blends containing nanofilled phase changing materials (<https://doi.org/10.3144/expresspolymlett.2017.71>).

Prof. Dr. Alessandro Pegoretti
Member of the International Advisory Board

*Corresponding author, e-mail: alessandro.pegoretti@unitn.it
© BME-PT