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Editorial corner – a personal view

The coronavirus and plastics

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In the past few years, more and more people have said that plastics should be banned and replaced with other materials because they pollute the environment. The plastics industry must constantly defend against these arguments: plastics do not pollute the environment and their ecological footprint is one of the smallest compared to materials in general. It is a problem that many people do not understand what polluting the environment means; they mix it with littering and do not know the meaning of ecological footprint. When the environmental friendliness of a product is evaluated, life-cycle assessment has to be carried out, which includes the whole process from design through manufacture and use to recycling or reuse. Only in this way can the environmental friendliness of products be compared (<https://doi.org/10.3144/expresspolymlett.2018.73>). If, for example, a car powered by an internal combustion engine is not in motion and the engine is not running it seems to be environmentally friendly. That is why not a short period but the whole process should be considered (<https://doi.org/10.3144/expresspolymlett.2018.81>).

In the past few months, plastics have been accused less because climate change has been in focus. Perhaps decision makers can be convinced that plastics are not equal to discarded packaging materials, and indeed they have a very significant role in reducing climate change – the use of plastics decreases the

weight of vehicles (cars, trucks, buses, trains, planes, boats), therefore less fuel is used, which means reduced emissions. Plastics also help with the production of renewable energy: examples are wind turbine blades, tidal turbine blades and biogas tanks (<https://doi.org/10.3144/expresspolymlett.2020.1>). Plastics have an enormous role in the medical implant and aid industries, and also in the pharmaceutical industry. A few examples are implants, prostheses, fastening elements, plastic organs and medical equipment. Thanks to them, medical procedures are faster and involve less pain.

In the past few weeks, every news bulletin starts with the coronavirus; stopping it is perhaps currently the most important task in the world. The virus strain (SARS-CoV-2) that causes the COVID-19 disease appeared at the end of 2019 and, in three months, it infected more than eight hundred thousand people and killed more than forty thousand (until March 31st, number of persons infected is 850 583 and number killed is 41 494 – source: Johns Hopkins University, Center for Systems Science and Engineering). The disease spreads from person to person by small droplets from the mouth or nose when the infected person breathes or coughs. A person can become infected by inhaling these droplets or by touching contaminated surfaces and then touching her/his mouth, nose or eyes. Two things are important in the

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protection from the virus: frequent disinfection of the hands and wearing a respiratory protective device. These protective devices – or simpler masks – are very important and, although they cannot prevent an epidemic or pandemic, they play an important role in prevention. If someone is suspected of being infected, they can greatly reduce the number of droplets the person spreads.

How is all this connected to plastics? Currently, the most sought-after product in the world is the face mask, which is made from plastic. There is a shortage of masks nearly everywhere, as everybody is trying to get at least a simple one. High-quality, high filtering facepiece (FFP) masks with valves are in even greater demand.

There are also masks, half-face respirators and full-face respirators with replaceable filters, or even carbon fiber filters. However, all of these masks, from the simplest to the most sophisticated, are made from polymer. Face masks have typically several layers, mainly polypropylene (PP), as PP microfibers are hydrophobic, skin friendly and non-allergenic. More expensive protective gear, which follows the contour of the face better, are mostly made from polyurethane (PUR), while the nano and microfibers of carbon filters are made by the carbonization of polyacrylonitrile (PAN). The elastic bands for fastening, the boxes containing the filter and the transparent cover are all plastic products. All masks and particle filters are made from plastics, and standards stipulate filter performance (must be minimum 80/94/99% efficient, marked usually as FFP1/FFP2/FFP3 in Europe or N95 (95%), N99 (99%), N100 (99,97%) in the

US), inhaling and exhaling resistance, lifetime, shelf life and other properties. Frequently applied standards are: NIOSH-42CFR84 (United States); EN 143, EN 149 (Europe); GB2626 (China); AS/NZS 1716 (Australia/ New Zealand); JMHLW-No. 214, 2018 (Japan). Another advantage of masks is that they prevent one from touching one's mouth or nose with a contaminated hand. This is also why it is very important to stress, as the media also does, the importance of frequent washing of the hands, preferably with a disinfectant soap. Further, protective equipment, such as face masks, plays another very important role. By decreasing the possibility of an epidemic or pandemic, they also stretch the spread of the virus in time, which means that the health care system does not have to treat a high number of patients at the same time.



It has to be understood that plastic products, including face masks, should not be thrown away but collected selectively and recycled so that they do not turn up in our rivers, oceans and forests as plastic waste. Masks used in hospitals may even be considered hazardous waste. In this case, physical recycling (which typically means extrusion in the melt state at about 180 °C) could be a safe way of disposal, as well.

Plastics are important because they are needed for sustainable development and they have properties that other materials do not have. Instead of banning them, we should use them responsibly where they are needed to improve the quality of our life, prevent a climate catastrophe and, if necessary, to stop the spread of contagious diseases – including *now* the coronavirus!