Editorial corner – a personal view 'Fake news' in polymer science?

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Science is about facts, isn't it? Well, in the end it is about results, their interpretation and the resulting – or underlying – theories. In polymer science, some of the most important theoretical concepts resulted from heavy disputes, like the original idea of macromolecules of Staudinger (see Mühlhaupt's paper, <https://doi.org/10.1002/anie.200330070>) or the chain folding in polymer crystal lamellae of Keller (his original paper from 1957, <https://doi.org/10.1080/14786435708242746> does not contain a single image). So, what can we judge to be a 'fake'? How should even an experienced referee recognize it at the time of generation? Is it possible at all to differentiate between sensational new findings and simply made-up stuff? Some recent examples may help us here.

In 2016 a paper on microplastic particle effects on fish larvae was published in the renowned journal *Science* (<https://doi.org/10.1126/science.aad8828>), presenting results which indicated a significantly negative effect on the organisms. In short, the paper suggested that fish larvae would eat polystyrene microparticles rather than edible material, develop slower and more likely be eaten by predators. Media around the globe picked up the story, turning it into headlines like 'Microplastics kill fish larvae' still affecting discussions in social media. The paper was a bit thin on original data, but the methods had been described in detail. Only a fellow scientist guessed that the study could not possibly have been done in the indicated period, initiating an investigation by the University of Uppsala. It turned out that a postdoc had fabricated data for the paper, while her supervisor had not taken sufficient care to control them. *Science*, in the end, decided to retract the paper.

Case number two is still open to judgement: A story about 'plastic-eating worms' appeared only recently in

the media, based on a scientific paper (<https://doi.org/10.1016/j.cub.2017.02.060>). Two things went wrong here: First, the reviewers overlooked the fact that the paper was basically a reproduction of an earlier paper (<https://doi.org/10.1021/es504038a>), just using a different species of moth larvae. Second, another team soon thereafter identified systematic problems with result interpretation (<https://doi.org/10.1016/j.cub.2017.02.060>). While different larvae obviously are capable of chewing holes into PE films, it is still unclear whether bacteriae in the larvae's guts are capable of degrading the polymer.

Everything fine? Not really – because these are two cases where attentive fellow scientists pointed out the problems with popularized works. We have no idea how many 'fake works' go unnoticed, especially if these are published in less controlled online journals which have popped up in recent years. These are normally characterized by three things: They bear titles closely resembling those of respected journals, they are financed by publication fees and they have a superficial reviewing process. Such journals have been found to publish even obviously made-up work, like studies from inexistent institutions. As experienced reviewer I can only recommend polymer scientists to stay away from such practices!

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