

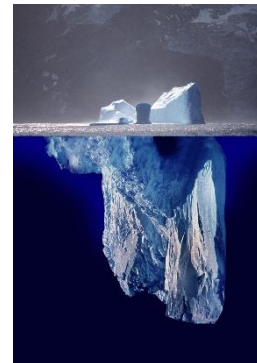
# Scientific Integrity Decline in Current Materials Research: Insights & Vistas Beneath the Tip of the Iceberg

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In the past decades, awareness of 'good scientific practice' has grown in universities and research institutions, in particular with the increasing cases of fraud and plagiarism, as well as with conflict of interest and authorship. Along with this, also more general ethical questions were raised concerning human genetics, animal welfare and data protection, the abuse of confidence or funding, or diversity and gender issues. For these broader ethical concerns, commissions were established and ombudswoman & -men are now frequently appointed, while for scientific misconduct, safeguarding guidelines are readily available.<sup>[1-3]</sup> In any case, such rules usually focus on most obvious violations (summarized under the term FFP: falsification, fabrication, plagiarism),<sup>[4,5]</sup> while their increasing, and systematic occurrence provide evidence for a much deeper, inherent crisis in scientific research and publication. For instance, 'CV polishing' by 'citation gaming' through excessive 'guest'- & 'hyper'-authorships and 'citation cartels' etc.<sup>[6]</sup> are raising deep concerns, questioning the concept of metrics-based quantitative evaluation,<sup>[7]</sup> and threatening the business model of the data suppliers. In fact, staggering 20% of the researchers were removed in the past three years from Clarivate's 'highly cited researcher' (HCR) list due to violation of scientific integrity.<sup>[8]</sup>

The seminar intends to shed light on these less obvious, but more fundamental aspects of scientific misconduct, being the fertile soil on which the more apparent violations proliferate. Diving deeper below the 'tip of the iceberg', we will argue that this soil is conditioned by societal premises, which (partly inadvertently) foster the crisis by a 'diktat of economization'. This erodes the self-conception of science, and its distinction from (in particular applied) research. We will show how this impregnates not only the questionable praxis of self-marketing and research hypes, but infiltrates researcher minds to corrode the basis of scientific thinking & working. For this, we will discuss examples from



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current materials/chemistry research, to see how this evokes more severe violations of scientific integrity. With this in mind, we finally draft fundamental elements of good scientific practice as guidelines for daily work, in particular addressing young researchers in chemical/materials research. We advocate for science self regulation, based on the principles of modesty, integrity & autonomy, being an antidote against the increasing dispraise of science as an opinion among others. Such rational discourse appears indispensable in times of a rapidly changing society with grand challenges ahead.

<sup>[1]</sup> see e.g. German Science Foundation (DFG): [Guidelines for Safeguarding Good Research Practice](#)

<sup>[2]</sup> The [European Code of Conduct for Research Integrity](#) (Revised Edition), ALLEA 2023, Berlin.

<sup>[3]</sup> COPE - Committee on Publication Ethics: see <https://publicationethics.org>

<sup>[4]</sup> M. Thomsen, [Ethics Inside and Outside the Physics Lab](#); in: R. Iphofen (Ed.) *Handbook of Research Ethics and Scientific Integrity*, p. 937-954, Springer 2020

<sup>[5]</sup> J. Mehlich, [Good Chemistry: Methodological, Ethical, and Social Dimensions](#), RSC Publishing, 2021

<sup>[6]</sup> for further reading on some relevant aspects, see links at [www.uv.es/jogiers/scientific\\_misconduct.html](http://www.uv.es/jogiers/scientific_misconduct.html)

<sup>[7]</sup> see e.g. Declaration on Research Assessment ([DORA](#)), Coalition for Advancing Research Assessment ([COARA](#))

<sup>[8]</sup> see e.g. the [analysis in El País](#).