BAM
Bundesanstalt für Materialforschung und -prüfung

Code to ensure scientific integrity of the Bundesanstalt für Materialforschung und -prüfung (BAM)

Preamble

In order to live up to its name and create knowledge, i.e., to generate reliable new findings, science must be able to rely on its cornerstones of honesty and inquisitiveness on the part of scientific employees. These fundamental principles apply to all disciplines and must be inherent in all research activities, though the rules of scientific professionalism may vary from discipline to discipline. Honesty and integrity form the ethical foundation underlying all scientific endeavours. The practical implementation of these ideals requires a sense of responsibility and trust from all scientists, both towards themselves and towards others. In addition to pure scientific work, these principles must also be embraced in the corporate culture. This applies in particular to guiding and enabling actions. These values must therefore be conveyed to young scientists both in training and in daily routine. An organisational structure focused on transparency and active exchange underpins scientific integrity.

The present code briefly summarises the principles for safeguarding the scientific integrity of BAM as a departmental research institution of the Federal Government and aims primarily at presenting its philosophy. A more detailed guideline for action with instructions and explanations on the interpretation of the principles described here is given in individual agreements and policies. The basis of the recommendations for action and the code are the "Guidelines to Ensure Good Scientific Practice" of the Deutsche Forschungsgemeinschaft (DFG, German Research Foundation) dated 3 July 2019, some of which are quoted here verbatim in excerpts. To facilitate navigation, the relevant guidelines of the DFG Code are listed for each chapter.

This code and its -underpinning policies are binding for all BAM employees involved in scientific work. They are announced to the employees via the BAM organizational handbook and regular instructions.

1. Principles of integrity in scientific work [1]

Honest scientific work requires analytical thinking and a systematic and methodical approach. It requires the contribution of independent ideas based on knowledge and the respectful use of the current state of knowledge. The distinction between new ideas and knowledge and existing intellectual property is ensured by correct scientific citation. Results are to be conscientiously checked for reproducibility and all information necessary for a renewed implementation of the knowledge gained is appropriately archived and retained. A critical distance is maintained in the interpretation of the results and the formulation of hypotheses. Scientists consider rights and obligations, in particular those resulting from legal requirements but also from contracts with third parties, and, if necessary, obtain and submit approvals and ethics votes. Regarding

[1] See also DFG Code of Conduct Guideline 2

research projects, a thorough evaluation of the research consequences and an assessment of the respective ethical aspects is carried out. The management of BAM guarantees the prerequisites for scientists to comply with legal and ethical standards.

2. Principles of integrity in scientific collaborations [2]

The division of labour in research and development units allows to exchange and discuss the gained knowledge in an atmosphere of mutual trust and respect. Interpretation of results is jointly discussed and implemented in a new collective knowledge base. Both in long-term work units as well as in project-based cooperation beyond the boundaries of organisational units, a critical discourse is welcome, regardless of hierarchical position. The transparent communication of work results ensures their validity through critical questioning and, if necessary, enables the reproduction by third parties. The responsibility for creating such an open atmosphere which allows scientific scepticism rests with the respective leader. To ensure that there is room for mutual questioning and increase of knowledge, the leader must instruct all team members on their tasks (rights and duties) and on the principles of integrity in science. Abuse of power and the exploitation of dependent relationships are prevented by appropriate organizational measures both at the level of the individual scientific work units and at the level of the BAM management.

3. Principles of integrity in the interaction with young academics [3]

The empowerment of young researchers is an integral part of a sustainable research culture. In addition to subject-specific knowledge, every researcher must therefore be taught the ethical aspects of science and the moral implications that research may have. In addition to theoretical instruction on the rules of good scientific practice, this instruction should also be integrated into everyday practical activities and be accompanied by an active example of standards for maintaining scientific integrity. Therefore, at BAM, an experienced scientist must be assigned to every young researcher, regardless of the situation of academic supervision. It must be guaranteed that this supervision relationship is close enough to ensure active participation in scientific work. Responsible supervision is only given if working hours allow for a regular exchange and if the number of supervised young scientists remains within a manageable range. In individual cases, the supervision of a young researcher can be delegated. The management of BAM is responsible for an appropriate career support for all scientists. Sincere advice on careers and training opportunities are offered to young scientists. There are clear, written procedures and principles for the selection and development of personnel as well as for the advancement of young scientists and for equal opportunities. Gender equality and diversity are considered in personnel selection and development. The corresponding processes are transparent and avoid unconscious bias as far as possible.

[2] See also DFG Code of Conduct Guidelines 1,3,4
[3] See also DFG Code of Conduct Guideline 2,3,4

4. Authorship of scientific publications [4]

The number of publications is often used as a criterion to evaluate researchers. However, the resulting pressure to publish must not lead to a decrease in the quality of individual publications or to a practice of "honorary authorship". A superior position alone does not necessarily imply co-authorship; an author is defined as a person who has made a genuine, comprehensible intellectual contribution to the content of a scientific text or to publication of data or software. The contribution must be made to the scientific content of the publication. In each individual case, it must be examined whether a contribution is genuine and replicable, and it depends on the subject area concerned. In particular, a comprehensible genuine contribution involves a scientifically relevant input to

- the development and conception of the research project or
- the preparation, collection, acquisition, provision of data, software, sources or
- the analysis/evaluation or interpretation of data, sources or
- the conclusions drawn from them, or
- the writing of the manuscript.

Smaller contributions can be noted in the acknowledgement.
Scientists agree on who should be indicated as authors. The agreement on the order of authors is established in a timely manner at the latest when the manuscript is drafted and it is based on comprehensible criteria considering the conventions of the area of expertise. All authors agree on the final version of the work to be published. They are jointly responsible for the publication unless explicitly stated otherwise. The required approval for the publication of results may not be refused without sufficient reason. The refusal of consent must be justified with verifiable evidence of data, methods, or results. Authors take care and, as far as possible, make sure that their research contributions are marked by the publishers or infrastructure providers in such a way that they can be cited by the users correctly. Inconsistencies in publications that are discovered subsequently are to be corrected.

5. Handling of research data [5]

Research results, in particular those subject to publication, must undergo a quality assurance across all phases of the research process. For this purpose, every step from the raw data to the knowledge gain must be documented and kept available. In addition to the experimental data, this requirement also applies to metadata that contain a complete description of the experimental conditions and the relevant environmental parameters and that are to be clearly assigned to the experiment. The required quality assurance concerns both the data and, if possible, the investigated samples as well as the applied methods including algorithms and software. The set of information to be provided should be sufficient, comprehensive, and unambiguous to enable an external expert to understand and reproduce the published findings. These datasets must be retained for a period of ten years from the date of publication and handed over when employees leave the institution. If the documentation of research results

[4] See also DFG Code of Conduct Guideline 14
[5] See also DFG Code of Conduct Guidelines 7,10,12,13,15

does not meet the relevant (technical) specifications, the limitations and reasons for this are explained in a comprehensible manner. An exploitation strategy must be drawn up early on for possible rights of use of the results in accordance with industrial property rights and agreed with all parties involved.

Software and algorithms developed within the framework of research projects should be archived centrally in an audit-proof manner in the form of sufficiently documented source code. In addition, each researcher should independently consider publishing in software repositories to guarantee open access to as many external parties as possible. When choosing scientific publication organs such as journals, it is also the responsibility of the respective researcher to reach the widest audience possible. In particular, publications with open access should be considered. A critical examination of the scientific honesty and reputation of the publication medium (sensitisation to so-called predatory journals) is also the responsibility of the authors. When publishing results, authors should also consider registering the data on which the findings are based in publicly accessible databases. Preference should be given to databases that provide data in accordance with the FAIR[6] principles.

The retention of electronic data, i.e., electronic archiving, must be carried out in accordance with the current state of the art and prevent manipulation and data loss as far as possible. BAM ensures the presence of the necessary infrastructure that enables backup and storage. These requirements also apply to the retention of sample materials. If it is not possible to store the materials used, the sample should be described and characterised as comprehensively as possible. Proper documentation and archiving as well as the regulations on access rights to archived data are the responsibility of employees at the management level, who may delegate those responsibilities accordingly.

6. Respectful examination and evaluation [7]

In many situations, scientists have to assess the quality of their colleagues' work. This is the case, e.g., in peer-review processes or in selection and recruitment procedures. The assessment of scientific achievement at BAM primarily follows qualitative standards. Quantitative indicators can only be included in the overall assessment in a differentiated and reflected manner. In these qualitative assessments, a respectful manner and objective approach must always be maintained even if the person to be assessed is in a competitive environment, expresses a different opinion or is at an advantage or disadvantage as a result of the assessment. Personal bias, which may arise for example from joint research activities with the person to be assessed, must be prevented at the stage of selection of the assessors. An unbiased selection should consider not only purely professional qualifications but also special achievements or liabilities along with other performance criteria. Special rules of confidentiality apply to the entire review process. The confidentiality of content to which reviewers or committee members gain access excludes disclosure to third parties or personal use.

[6] The principles for data recommended by the FORCE11 group in 2016 are: findable, accessible, interoperable and reusable

[7] See also DFG Code of Conduct Guideline 5,16

Confidentiality and the disclosure of reasons for bias are the responsibility of the respective reviewers.

7. The role of ombudspersons [8]

BAM appoints two ombudspersons to whom all scientists working at BAM can turn in questions of good scientific practice and in case of suspected scientific misconduct. All scientific employees can contact the ombudspersons, including scientific technical personnel, temporary employees and associated junior scientists working under supervision. Announcements on the Infoportal and in the minutes of the board of directors ensure that the ombudspersons are sufficiently known in the institution. Should bias be suspected or should one ombudsperson be unable to be in charge, the other can act in place.

The ombudspersons may not be members of BAM's Board of Directors during the exercise of this office. The term of office of ombudspersons is limited to three years. A further term of office is possible. As a rule, scientists of integrity and with management experience are selected as ombudspersons. They advise as neutral and qualified contact persons in questions of good scientific practice and in cases of suspected scientific misconduct and contribute, as far as possible, to solution-oriented conflict mediation. The ombudspersons accept the enquiries while maintaining confidentiality and, if necessary, forward suspected cases of scientific misconduct to the responsible body. In the performance of their duties, ombudspersons receive acknowledgement and the necessary substantive support from the management.

8. Elements of scientific misconduct [9]

Breaches of probity are understood as a scientific misconduct. In a scientifically relevant context, such misconduct occurs, amongst others, if false information is deliberately or grossly negligently given, intellectual property rights of others are infringed, or their research activities are impaired in any other way. The circumstances of the individual case are decisive. In addition to the forgery of data, the false presentation of data includes their falsification, for example by selecting and rejecting undesired results without disclosure or by manipulating a representation or a figure. False presentation also includes the of indication of incorrect information in a job application or in an application for funding (including false information on the publication medium and on publications in print). Infringements of intellectual property rights are deemed to include, but are not limited to, unauthorised exploitation of authorship (plagiarism), exploitation of research approaches and ideas, in particular as a reviewer (theft of ideas), presumption or unfounded assumption of scientific authorship or co-authorship, falsification of the content or unauthorised publication and unauthorised access to third parties as long as the work, knowledge, hypothesis, teaching or research approach has not yet been published. Furthermore, the claiming of the (co-)authorship of others without their consent is punished as an infringement of intellectual property rights. Impairment of the research activities of others is understood to be, for example, sabotage of research activities (including damaging or manipulating experimental set-ups, devices, documents, hardware, software, chemicals or

[8] See also DFG Code of Conduct Guideline 6,18
[9] See also DFG Code of Conduct Guideline 1

other things required to conduct an experiment) or removal of primary data. Co-responsibility can result, for example, from active participation in the misconduct of others, knowledge of falsifications by others, co-authorship of falsified publications and gross neglect of the duty of supervision.

9. Procedure in the event of suspected scientific misconduct or accusation [10]

Depending on the severity of the offence, the proof of scientific misconduct can result in consequences which fall under labour or employment law, academic law and civil and criminal codes. The appropriate measures are chosen depending on the individual case, for example, disciplinary proceedings, warnings, dismissals, withdrawal of academic degrees, ban from the premises and/or claims for damages.

Investigations of allegations of scientific misconduct will be conducted in accordance with confidentiality and the presumption of innocence until there is evidence of scientific misconduct regarding those involved and the determined findings. If the whistleblower is known by name, the investigating body will treat the name confidentially and will not pass it on to third parties without appropriate consent. The only exception is if there is a legal obligation to do so or if the person affected by the allegations cannot defend him/herself properly. In the latter case, the whistleblower is given the opportunity to withdraw their report. Neither the whistleblower nor the person affected by the allegations should suffer any disadvantages for their scientific or professional advancement as a result of the report. In any case, this applies to the person concerned until scientific misconduct has been formally determined.

The procedure to be followed in the event of non-compliance with good scientific practice and suspected scientific misconduct at BAM is described in a process scheme. Any suspicion of scientific misconduct must first be reported to the appointed ombudspersons or, alternatively, to the central "Ombudsman for Science" committee appointed by the DFG. The internal ombudspersons first give the accused person the opportunity to make a personal statement. If necessary, they subsequently moderate a discussion between the parties involved. If possible, the allegation should be clarified in such mediation talks and the conflict should be settled. This is particularly possible if the accusation is either based on misunderstandings or if the accused has acted dishonestly to a minor degree and admits to the misconduct.

If the allegations cannot be refuted and the conflict cannot be resolved or the misconduct corrected, the internal ombudspersons will refer the suspected case to an internal investigation committee. Committee members with any appearance of bias do not take part in the deliberations of the specific individual case. The committee will freely assess the evidence to determine whether scientific misconduct has occurred and what measures are to be taken. The sanctions can range from a written complaint to the exclusion from funding or to the initiation of legal measures.

signed Prof. Dr. Ulrich Panne

[10] See also DFG Code of Conduct Guidelines 18,19