National Institute of Chemical Physics and Biophysics (NICPB)

1. Scientific Impact of Research

1.1. Positive aspects
The panel reviewed a subsection of the Institute's work, with a focus on biophysics, nanoecotoxicology, environmental chemistry, high resolution terahertz spectroscopy as well as applied bioenergetics and cancer metabolism. On the positive side, although the proportion of publications in open science was not previously high, more recently this has improved and includes examples of publications in high quality journals such as ACS Analytical Chemistry, RSC Chemical Communications and PLOS one. The number of peer-reviewed publications, as presented in the report and during the site visit has fluctuated over the assessment period, but with an increasing rate of open access (100% in 2023). Most of the publications have been published by well-known international publishing houses and/or in well-known international professional journals. There is also an increase of impact of articles (from 1.4 to 2.2) (Category Normalized Citation Impact). Overall, the panel found that the majority of R&D outputs are at a good international level, evidenced by the % in Q1 journals over the assessment period. The results attract international interest in the field, evidenced by presentation at international conferences, partnerships and publication in internationally leading analytical journal(s). The panel was also pleased to see some impressive work at the state-of-the-art in NMR, with a focus on improving analytical performance for biofluid analysis. This potentially has a longer-term impact in a range of biopharmaceutical and diagnostic applications (although currently this remains to be validated). This activity is supported by a helium liquefier facility, unique to Estonia. The R&D activities have led to 4 patents. The panel also saw good evidence of translation of technology from the environmental toxicology/ nanomaterials group, with IP protected as a patent and licenced into a spin-out creating smart dressings.

1.2. Areas for improvement
Whilst the research activity in NMR was, as stated impressive, the two other areas which the panel visited presented work that was considered by the panel to be less strong internationally (although it was noted that in the area of environmental toxicology fundamental research on nanoparticle-microbial interactions had led to a patent application that had been licenced to a spin-out).
1.3. Recommendations
The panel felt that the Institute should seek to build stronger external links, both nationally with universities and with clinical groups.
Assessment of the scientific impact of research
Exceeds threshold.

2. Sustainability of Research

2.1. Positive aspects
Although there are >125 FTEs in the Institute, the research in (bio)medical and health is a stable and well-structured activity with a dedicated group of ~10 FTEs, ensuring continuity and expertise in the field. The team has a balanced composition, including a good representation of individuals who identify as women, contributing to long-term sustainability and capacity building in the research area. The number of PhDs defended and number of PhD students has been stable across the evaluation period. The doctoral students we met demonstrated strong commitment and dedication. During the visit the panel met with early career researchers and PhD students who provided positive feedback on the quality of supervision and the research laboratory environment. In general it was noted that many aspects of the work was ambitious, and required the development of inter-disciplinary skills. Overall the panel was impressed by the challenging nature of the work being undertaken, with particular highlights being around the NMR group,

in environmental toxicity (probing both atmospheric and aquatic systems) as well as work in antimicrobial nanomaterials.
Parental leave appeared to be readily accessible with three students having young families and having benefited from flexible leave. The Panel also noted a strong commitment towards equality diversity and inclusion in NICP, particularly around gender, with a notable motivation to acheieve gender equality, serving also to enhance sustainability.
Some aspects of the infrastructure are in good condition, particularly those around the NMR equipment, creating very good conditions for internationally leading R&D in the field with strong evidence of enagagement with early career researchers providing an appropraite environment for conducting doctoral studies.
The environmental toxicology group has established significant scientific resources, including databases on environmental toxins and microbial collections, which are accessible to both the scientific community and for practical applications, demonstrating the scientific potential of the field in addition to the environmental perspective.
The team working in the area of antimcrobial nanomaterials also showed good evidence of impact supporting knowledge exchange and economic growth through their close work with a spin-out company developing wound healing (having helped to support three patent applications/patents which are being exploited by this SME).
The financial volume of contracts from the public sector (domestic and foreign) per R&D employee has remained stable across the evaluation period, which is a sign of the institute's self-sustainability.
Although there has been no substantial growth in the indicators of research sustainability, they have remained consistent, providing an appropriate foundation for further development.
The institution's ability to ensure the quality of research and secure funding exceeds the evaluation threshold and confirms the presence of scientific sustainability.

2.2. Areas for improvement

The institute's research activities are built on strong research groups that have convincingly demonstrated their ability to advance science and ensure sustainability. However, the introductory session revealed interpersonal tensions within the leadership, which may affect the internal functioning of the organization and its external image. Strengthening the management structure and defining a clearer shared strategic vision would support further development and ensure the long-term sustainability of research activities.
The institute has successfully utilized external funding, but a better distribution of internal resources and a more diverse selection of funding sources, including greater involvement

from the private sector, would help strengthen the institution's strategic direction and support growth and future recruitments.
2.3. Recommendations
The Institute as a whole should decide whether it wants to grow success in the area of biomedical and health sciences research and if so, it needs to lobby for investment to do so. Some of the infrastructure is in need of updating, and with the exception of the analytical NMR, there is a more general need of investment in basic equipment to support specialist research and create a well-supported research environment that will attact postgraduate students. It was noted that NICP is not a University and although there is current engagement with the main Estonian Universities all of areas of research in (bio)medical and health would benefit from strengthening these interactions. In particular it is recommended to form closer links into Tal Tech, due to its geographical proximity - to help NCIP to reach a critical mass of students and staff. Such interactions would also help by providing researchers better research infrastructure, and a wider access to a range of technical and transferable skills courses, resulting in a more complete/integrated environment for PhD training. As a minor recommendation, as part of the drive towards diversity and inclusivity, the gender equality plan should also be available in other languages (most notably English).
Assessment of the sustainability of research
Exceeds threshold.

3. Societal Impact of Research

3.1. Positive aspects
Healthcare and economic benefits may result from the smart bandage spinout. Direct funding is received from the Ministry of the Climate demonstrating broad utility of the research. Educational impact arises from individuals who give lectures at the Open University and Tal Tech, as well as guest lectures and public dissemination, whilst their PhD students have been awarded prizes in national competitions over the last three years. The PhD students also indicated that they had been involved in events with Tal Tech.

Approximately half of the R&D staff are involved in advisory work, which was deemed to be relatively high, when compared with similar institutes internationally. The institute has been involved in COST networking.
3.2. Areas for improvement
During the visit the groupings provided less evidence of public engagement, although the report refers to digital media including websites and TV shows as well as popularisation lectures in cancer in Tal Tech. As a recommendation the Insitute should seek to develop a clear strategy for public engagemnet, and method to demonstrate the societal and healthcare benefits of their research.
3.3. Recommendations
The group should develop a sustained activity of public engagement, using for example the translation of IP around antimicrobial smart bandages to show societal impact. The groups could engage further with clinicians and patient organisations to increase their visibility and opportunities.
Assessment of the societal impact of research
Exceeds threshold.

4. Assessment proposal

4.1. Proposal summary
In accordance with Section 8.4 of the Regular Evaluation Guidance 2024, the research and development activities of the National Institute of Chemical Physics and Biophysics in the field of Medical and Health Sciences are proposed to be evaluated **positively**, as all assessment criteria meet or exceed the established thresholds.

5. Additional Feedback

5.1. Feedback on the institution's additional questions that are described at the final page of the report
N/A