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Editorial journal inauguration — *npj Biosensing*

The field of biosensing is undergoing remarkable advancements, spurred by the pressing demand for innovative solutions across various domains, including disease diagnosis, health monitoring, environmental surveillance, and biomarker discovery. This progress is particularly evident in biosensor applications, where technologies are evolving rapidly to meet the diverse and complex needs of healthcare, environmental science, and beyond.

As we launch *npj Biosensing*, our mission is to provide a multi-disciplinary open access platform dedicated to advancing biosensing, with a focus on disease-oriented techniques. We aim to highlight innovations in biosensing hardware and software technologies, as well as pioneering protocols and methods that enhance biomarker detection and discovery in complex biological samples.

Our scope encompasses a broad range of hardware technologies for biosensing, including optical, electrical, electrochemical, mechanical, magnetic, and acoustic fields, among others. At the same time, we deeply value the role of biological "software" or affinity reagents, such as antibodies, aptamers, peptides, single-domain "nanobodies," and lipids.

Artificial intelligence (AI) is poised to transform the design of these molecules and affinity reagents, enhancing their specificity and functionality, and paving the way for novel drug development and biosensing applications. Further, AI is transforming the landscape of biosensing. We welcome submissions that demonstrate AI-enhanced biosensing, from data interpretation and predictive modeling to optimizing biosensor design and improving affinity reagents. AI's ability to enhance the sensitivity and predictive capabilities of biosensors holds tremendous promise for the future of healthcare diagnostics.

npj Biosensing prioritizes translational research with direct clinical relevance. We particularly encourage studies that utilize biological samples from liquid biopsies and other complex media, such as blood, saliva, urine, skin, cerebrospinal fluid, and tissues. This focus aligns with our mission to move biosensing technologies from the laboratory to practical healthcare solutions, ultimately improving global health outcomes.

In light of the growing prevalence of neurodegenerative diseases like Alzheimer's and Parkinson's, we are particularly interested in research that addresses the detection of misfolded proteins. This area of disease-oriented biosensing is critical for early diagnosis and intervention, making it a key focus of our journal. With this in mind, we have launched a special Collection on protein misfolding diseases (https://www.nature.com/collections/bcifiagdaa).

Recognizing the increasing role of wearable technology in healthcare, we encourage submissions that explore the advancement of biosensors designed for integration into wearable, portable, and stretchable devices.

The inauguration of *npj Biosensing* is marked by a selection of articles that showcase innovations across various aspects of biosensing.

Elgendi et al.[1] make an advancement in remote photoplethysmography by introducing a novel Signal Quality Index (SQI) aimed at improving heart rate detection and cardiac assessment via mobile devices. By implementing a practical threshold for the signal-to-noise ratio index (NSQI < 0.293), their methodology effectively identifies high-quality cardiac information in video frames, significantly reducing noise and artifacts. Validated on publicly available datasets with advanced machine learning algorithms and cross-validation, this approach not only enhances efficiency in health monitoring applications but also offers a pragmatic solution for remote biosensing. This innovation marks an important step forward in the development of remote cardiac monitoring technologies with digital healthcare implications.

In a Perspective article, Elgendi et al.[2] discuss the potential of salivary sialic acid (SA) as a non-invasive biomarker for cancer prescreening, particularly for oral and breast cancers. They highlight the benefits of portable Raman spectrometers for SA analysis, despite challenges with cost and sensitivity. This perspective emphasizes the significance of developing accessible and timely cancer detection methods, which could revolutionize early diagnosis and monitoring, especially in remote or underserved areas.

Christenson et al.[3] introduce capillary-based quaking-induced conversion (Cap-QuIC), an innovative and economical biosensing technique designed for detecting protein misfolding diseases. This approach harnesses capillary action to visually identify misfolded proteins linked to conditions such as Parkinson's disease and chronic wasting disease (CWD), eliminating the necessity for costly equipment. By using glass capillaries, Cap-QuIC can distinguish misfolded proteins from their native counterparts with high accuracy, as demonstrated in tissue samples from wild white-tailed deer infected with CWD. This approach aligns with *npj Biosensing*'s focus on developing accessible and practical diagnostic tools for neurodegenerative diseases, offering potential for point-of-care applications and broadening the scope of early disease detection globally.

Kanoda et al.[4] present a high-throughput light-induced immunoassay utilizing a nanoparticle-imprinted plasmonic substrate (NPI-PS). This innovative method significantly enhances the sensitivity and speed of protein biomarker detection. By using milliwatt-class laser irradiation, anti-spike-protein antibodies for severe-acute-respiratory-syndrome-related coronavirus 2 are rapidly coated on the NPI-PS within 1 min, enabling the selective detection of nanoparticles modified with spike proteins within minutes. This approach achieves up to 100 times higher sensitivity compared to conventional methods and offers a powerful strategy for mitigating pandemic threats and detecting various diseases through efficient and rapid biomarker identification. The findings highlight the potential for developing compact biochips for portable and high-throughput on-site testing.

As the editors of *npj Biosensing*, we are delighted to present the first issue of our journal. This inaugural edition represents the beginning of an exciting journey. We believe *npj Biosensing* will become a vital venue for researchers and practitioners dedicated to advancing biosensing technologies, disease diagnostics, and improving global healthcare. We invite you to join us in advancing the field of biosensing by contributing your research and insights, helping to drive meaningful progress in healthcare and diagnostics.

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Author contributions

Sang-Hyun Oh drafted the main text, and all authors reviewed the manuscript.

Competing interests

The authors declare no competing interests.