

KANG, JIWON

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Gwangju Institute of Science and Technology (GIST)
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RESEARCH INTERESTS

- Optical design, simulation, and nanofabrication of nanophotonics
- Multi-functional photonics applications
- Advanced optoelectronics and flexible electronics
- Biophotonics and bioimaging
- Deep learning and programmable matter

EDUCATION

Korea Advanced Institute of Science and Technology (KAIST), Korea

Ph.D. in Electrical Engineering, pursuing
Advisor: Prof. Min Seok Jang

Gwangju Institute of Science and Technology (GIST), Korea

M.S. in School of Electrical Engineering and Computer Science, 2023
Advisor: Prof. Young Min Song

Soongsil University, Korea

B.S. in Electronic Engineering, 2021
Graduated as *Salutatorian*
(Note: Military Service during Sep 2016 - Jun 2018)

RESEARCH EXPERIENCE

GRADUATE RESEARCH ASSISTANT

Sep 2023 – Present

Korea Advanced Institute of Science and Technology (KAIST), Daejeon, Korea
School of Electrical Engineering
Advisor: Prof. Min Seok Jang

GRADUATE RESEARCH ASSISTANT

Sep 2021 – Aug 2023

Gwangju Institute of Science and Technology (GIST), Gwangju, Korea
School of Electrical Engineering and Computer Science
Advisor: Prof. Young Min Song

UNDERGRADUATE RESEARCH ASSISTANT

Mar 2021 - Aug 2021

Gwangju Institute of Science and Technology (GIST), Gwangju, Korea
School of Electrical Engineering and Computer Science
Advisor: Prof. Young Min Song

UNDERGRADUATE RESEARCH ASSISTANT

Jan 2021 - Feb 2021

Pohang University of Science and Technology (POSTECH), Pohang, Korea
Department of Electrical Engineering
Advisor: Prof. Yoonyoung Chung

RESEARCH ACTIVITIES

Wearable neck microphone

Mar 2021 – Jun 2021

Individual Research Focus: Optimization and experiment of neck microphone

Feline Eye Camera

Mar 2021 – Jun 2021

Individual Research Focus: Paper survey about the origin and structure of *tapetum lucidum*

DeepGT: Deep learning-based quantification of nanosized bioparticles in bright-field micrographs of Gires-Tournois biosensor

Sep 2021 - Oct 2023

Funding: GIST Technology Institute (GTI) research fund, Korea

Individual Research Focus: Leading overall project

TECHNICAL EXPERTISE

PROGRAMMING / SIMULATION SOFTWARE

- Matlab (Advanced, Complex optical coefficients & Chromatic values calculation)
- Python (Intermediate, Data visualization and manipulation using Pandas, Numpy, Matplotlib)
- DiffractMod (RSoft, RCWA method, Synopsys), FullWave (RSoft, FDTD method, Synopsys)
- Lumerical (Photonics simulation software)

SEMICONDUCTOR NANOFABRICATION

- Holographic lithography, photolithography
- Plasma-enhanced chemical vapor deposition (PECVD), rapid thermal annealing (RTA), wet thermal oxidation, electron-beam evaporation, RF magnetron sputtering with an ellipsometer
- Reactive ion etching (RIE), inductively coupled plasma etching (ICP-RIE)
- Wafer lapping and polishing, wafer dicing and wire bonding

CHARACTERIZATION EQUIPMENT

- Scanning electron microscopy (SEM), transmission electron microscopy (TEM), atomic force microscopy (AFM), surface profiler
- Ellipsometer, UV-VIS-NIR spectrometer, *in-situ* reflectance monitoring of thin film
- Water contact angle measurement, Humidity and chemical gas sensing measurement

PUBLICATIONS

Notes: † indicates equally contributing authors. * indicates the corresponding author(s).

PEER-REVIEWED JOURNALS

4. **Kang, J.†**, Lee, J.†, Yoo, Y.J., Kim, S.*, and Song, Y.M.* SARS-CoV-2 mass screening with quantitative bioimaging using Gires-Tournois immunosensor. *in preparation*

3. **Kang, J.†**, Yoo, Y. J.†, Park, J.-H.†, Ko, J.H., Mahmud, A.A., Jeon, H.-G.*, and Song, Y.M.* DeepGT: Deep learning-based quantification of nanosized bioparticles in bright-field micrographs of Gires-Tournois biosensor. *submitted*

2. **Kang, J.†**, Yoo, Y.J.†, Ko, J.H., Mahmud, A.A., and Song, Y.M.* Trilayered Gires–Tournois resonator with ultrasensitive slow-light condition for colorimetric detection of bioparticles. *Nanomaterials* **13**, 319-330 (2023).

1. Yoo, Y.J.†, Ko, J.H.†, Lee, G.J., **Kang, J.**, Kim, M.S., Stanciu, S.G., Jeong, H.-H., Kim, D.-H.*, and

Song, Y.M.* Gires–Tournois Immunoassay Platform for Label-Free Bright-Field Imaging and Facile Quantification of Bioparticles. *Adv. Mater.* **34**, 2110003 (2022) [[Front Cover Picture Article](#)]

PEER-REVIEWED CONFERENCE PROCEEDINGS

1. Song, Y., Kim, Y., Yun, I., Jeung, J., **Kang, J.**, and Chung, Y.*, Study on Optimal Position and Covering Pressure of Wearable Neck Microphone for Continuous Voice Monitoring. *2021 43rd Annual International Conference of the IEEE Engineering in Medicine & Biology Society (EMBC)*, 2021 (doi: 10.1109/EMBC46164.2021.9629724)

PROCEEDINGS AND PRESENTATIONS

3. **Kang, J.**, Park, J.-H., Yoo, Y. J., Ko, J.H., Jeon, H.-G.*, and Song, Y.M.* Facile Quantification of Nanosized Bioparticles in Bright-field Micrograph via Deep Learning, *2023 MRS Spring Meeting*, San Francisco, USA. 2023

2. **Kang, J.**, Park, J.-H., Yoo, Y. J., Jeon, H.-G.*, and Song, Y.M.* Quantitative detection of minuscule bioparticles in bright-field micrograph via learning-based algorithm. *2022 Photonics Conference*, Pyeongchang, Korea. 2022

1. **Kang, J.**, Yoo, Y.J., Ko, J.H., Song, Y.M.* Label-free colorimetric SARS-CoV-2 immunosensor based on thin-film. *2021 Photonics Conference*, Pyeongchang, Korea. 2021

AWARDS AND FELLOWSHIPS

Excellent Poster Award in the GIST EECS, Korea (Dec 2022)

Title: “Quantitative detection of minuscule bioparticles in bright-field micrograph via learning-based algorithm”, **Kang, J.**, Park, J.-H., Yoo, Y. J., Jeon, H.-G.*, and Song, Y.M.*

Excellent Thesis Award in the 2022 Photonics Conference, Korea (Dec 2022)

Title: “Quantitative detection of minuscule bioparticles in bright-field micrograph via learning-based algorithm”, **Kang, J.**, Park, J.-H., Yoo, Y. J., Jeon, H.-G.*, and Song, Y.M.*

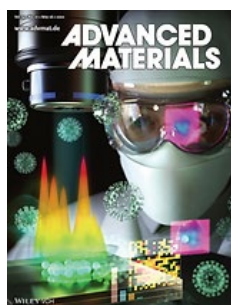
Excellent Poster Award in the GIST EECS, Korea (Dec 2021)

Title: “Label-free colorimetric SARS-CoV-2 immunosensor based on thin-film”, **Kang, J.**, Yoo, Y.J., Ko, J.H., Song, Y.M.*

Summa Cum Laude, Soongsil University (2021)

Baek-Ma Academic Excellence Scholarship, Soongsil University (2019)

COVER PICTURES



The cover image shows a concept illustration of Bioparticle Imaging and Analysis an intuitive and robust approach for the label-free bright-field imaging and facile quantification of bioparticles using a Gires–Tournois immunoassay platform (GTIP). The particle distribution and density on the surface of the resonator are readily analyzed through 2D raster-scanning-based chromaticity analysis. *Adv. Mater.* **2110003**, 2022