7th International Workshop on 2D Materials

Title of the Presentation: Mass classification of materials using machine learning in noisy environment

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Short Biography:

Miri Seo is a doctoral student of the Department of Physics, Ewha Womans University. She received BSc (2011) and MSc (2013) from Konkuk University. She has worked as a researcher at patent company and university from 2013 to 2016. Her current research focuses on applications of artificial intelligence to improve the characteristics of 2D devices, particularly deep learning and machine learning. She received Best Poster Award from The Korean Physical Society (2012), Young Woman Researcher Award from the Center for Woman in Science, Engineering and Technology, WISET, (2012).

Abstract:

We studied an optimal algorithm of machine learning to determine accurate measurement value our of noisy environment on the frequency change of the nanomechanical resonator for mass detection. In measuring devices made of low-dimensional materials, noise is one of the main factors that interfere with the device's intrinsic properties. Especially, if the noise included in the frequency is larger than the mass of the substance to be measured, the accuracy of the data is degraded due to the noise in an experiment in which the mass is confirmed through frequency measurement. We calculated the noise generated by the device itself and confirmed the limit of classifiable mass in a noisy environment using an artificial intelligence algorithm. The algorithms we used are largely divided into machine learning algorithms and deep learning algorithms. Using the various algorithm models included in each, the possible range of classifiable masses was confirmed. Also, we considered what needs to be improved to increase the reliability of the measurement results in actual experiments.

[1] J. E.-Y. Lee et al., Appl. Phys. Lett. 91, 234103 (2007).
[2]K. He et al., CVPR. 16541111, 1063-6919 (2016).
[3]H. I. Fawaz et al., DMKD. 33, 917-963 (2019).

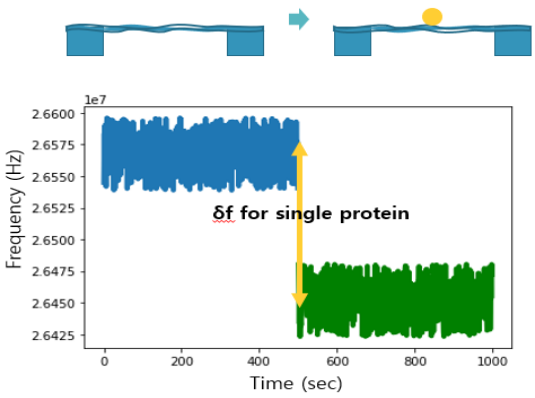

Fig. 1. Device structure and frequency vs time graph