第68回応用物理学会春季学術講演会 講演予稿集 (2021 オンライン開催)

Beam tuning parameter optimization by Neural Network on the NISSIN BeyEX medium current ion implanter

ShinyaTakemura, Shigeki Sakai ,Eiichi Murayama[A], Ayato Ejiri[B]

Nissin Ion Equipment CO., LTD., 575 Kuzetonoshiro-cho, Minami-ku, Kyoto, Japan[A]
Cross Compass Ltd., 2-9-11-9F Shinkawa, Chuo-ku, Tokyo, Japan[B]
takemura_shinya@nissin.co.jp,　TEL : +81(75)934-8276

In the ion implantation process on mass production of semiconductor devices, beam tuning parameters are important settings that directly affect the productivity. However, since the parameters are verified by physically complex interactions such as ion source conditions, installation accuracy, and beamline contamination, the parameters gradually mismatch against the optimized process, resulting in the need for periodic manual beam setup interventions to acquire adequate parameters.

We have developed automatic parameter tuning system to verify optimal parameters for the current equipment status from the past parameter tuning results using neural network system. In order to study neural network system, we have to consider two objective variables. One is beam tuning time and on the other hand is beam tuning parameters. In order to adjust two objective variables we have developed the combination of two neural networks.

First we have studied that tuning time can be accurately predicted from the transition of the equipment status, we conducted an analysis with an inference model. As a result of original random forest inference for the neural network, we succeeded in creating a model with an accuracy rate of more than 90%.The system was created and simulated, and the results showed that the beam setup time was reduced in certain condition.Results show that the tuning time is significantly reduced over 500 seconds conditions in the past.Other than that, using neural network the variation of each parameter is reduced. This result suggests an improvement in the process quality.