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The diagnosis of Plasma Through RGB Data Using Rough Set Theory

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In semiconductor manufacturing field, all equipments have various sensors to diagnosis the situations of processes. For increasing the accuracy of diagnosis, hundreds of sensors are emplyed. As sensors provide millions of data, the process diagnosis from them are unrealistic. Besides, in some cases, the results from some data which have same conditions are different. We want to find some information, such as data and knowledge, from the data. Nowadays, fault detection and classification (FDC) has been concerned to increasing the yield. Certain faults and no-faults can be classified by various FDC tools. The uncertainty in semiconductor manufacturing, no-faulty in faulty and faulty in no-faulty, has been caused the productivity to decreased. From the uncertainty, the rough set theory is a viable approach for extraction of meaningful knowledge and making predictions. Reduction of data sets, finding hidden data patterns, and generation of decision rules contrasts other approaches such as regression analysis and neural networks. In this research, a RGB sensor was used for diagnosis plasma instead of optical emission spectroscopy (OES). RGB data has just three variables (red, green and blue), while OES data has thousands of variables. RGB data, however, is difficult to analyze by human's eyes. Same outputs in a variable show different outcomes. In other words, RGB data includes the uncertainty. In this research, by rough set theory, decision rules were generated. In decision rules, we could find the hidden data patterns from the uncertainty. RGB sensor can diagnosis the change of plasma condition as over 90% accuracy by the rough set theory. Although we only present a preliminary research result, in this paper, we will continuously develop uncertainty problem solving data mining algorithm for the application of semiconductor process diagnosis.