

Combinatorial approach for the scheduling of Automated Wet-etch Stations

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In the last few years, several papers presented methods to optimize the scheduling of Automated Wet-etch Stations, that are responsible for a crucial production stage in semiconductor manufacturing. Stations consist of chemical and water baths for the wafer lots to go through, and one or more transporting robots. There is no intermediate storage, etching (zero-wait) and cleaning (unlimited-wait) stages alternate through the process and the robots are common resources in the system.

The characteristics of the system makes its scheduling a complex optimization problem. In this work, a novel combinatorial approach is presented for the scheduling of automated wet-etch stations. The S-graph based scheduling approach of chemical batch processes was extended for the characteristics of the wet-etch scheduling problems. Some problem properties had inherent redundancy which was exploited to reduce the solution time. The performance and applicability of the developed method was compared on literature examples with former approaches from the literature. The results showed that the new combinatorial method can compete and in some cases outperform the MILP based approaches. Thus, the S-graph framework holds potential for the optimization of automated wet-etch stations.

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