

Background of the thesis

Modern semiconductor processes consume large amounts of energy and materials in various forms. This includes the usage of large amounts of direct energy in the form of cleaning, production, and filtering procedures. However, in addition to the direct consumption, research is devoted to understand and model the individual consumption of the processes to which multiple processes contribute. A key process among the production line is epitaxy. One major energy impact is in the form of gases and precursors needed for the chemical vapour deposition (CVD) processes such as metal-organic CVD or MOCVD, which have an increasing impact on the global energy and material balances.

Thus the main objective of this thesis is to investigate possibilities of consumption mitigation of energy and other resources in a key process of electronics for power switching, RF generation, or light emitting diode (LED) production, respectively.

Energy is a major source for potential improvement measurements, while in parallel availability of the resources in the production process and other KPIs for sustainability are to be considered.

Intended tasks

1. Understanding of the role of epitaxy in the overall process for electronics and optoelectronics.
2. Understanding the main consumers of energy in an epitaxial process based on the data available.
3. Understanding and quantification of energy and resource consumption for the pre-products (RF-generators, gases and precursors).
4. Evaluate material consumptions of two types of wafer fabrication, e.g. a power transistor and a LED.
5. Establish key sustainability indicators and models for processes.
6. Perform simulations of wafer processing.
7. Detailed selection of measures of improvement for sustainability.
8. Detailed performance comparison of the proposed measures with their impact.
9. Writing the thesis.

Contact and supervision

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Duration

According to exam regulations, (6 months)

Application documents

Please send your relevant application documents in a PDF-file (cover letter, resume and transcript of records (Bachelor grades) in an e-mail to:

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