

PROBING NEUTRAL OXYGEN ATOMS BY LASER-OPTIC CATALYTIC SENSORGREGOR PRIMC^{1,2}

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Abstract. Europe is facing the fourth industrial revolution, referred to as Industry 4.0. Concepts of Industry 4.0 include smart automation, virtualization, advanced prediction with artificial intelligence and general robotization and automation. Many processes, as well as devices, are not ready for such a big leap in automation, one of them being plasma devices, which are, from a user perspective, regarded as “black boxes”. Typical plasma devices have measurable and adjustable discharge parameters (electrical voltage, current, frequency, gas inlet, pressure). On the other hand, plasma parameters, such as fluxes of reactive species on the plasma-treated products and temperature of reactive species, which are crucial information in precise and reliable plasma process control, are not monitored, let alone controlled. Complying with the Industry 4.0 standards, processes have to be monitored by numerous advanced sensors that are coupled to into a smart control system. We have made a first step in developing a laser-optic catalytic sensor that is capable of measuring neutral oxygen atom density in a low-pressure gaseous plasma with low ion-to-neutral-atom ratio. Next challenge is the development of smart industrial reactors that will be able to self-regulate plasma parameters sustaining homogeneous plasma throughout the whole production process.

References

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