# New tool measures plasma source and color of light simultaneously to improve microchip production

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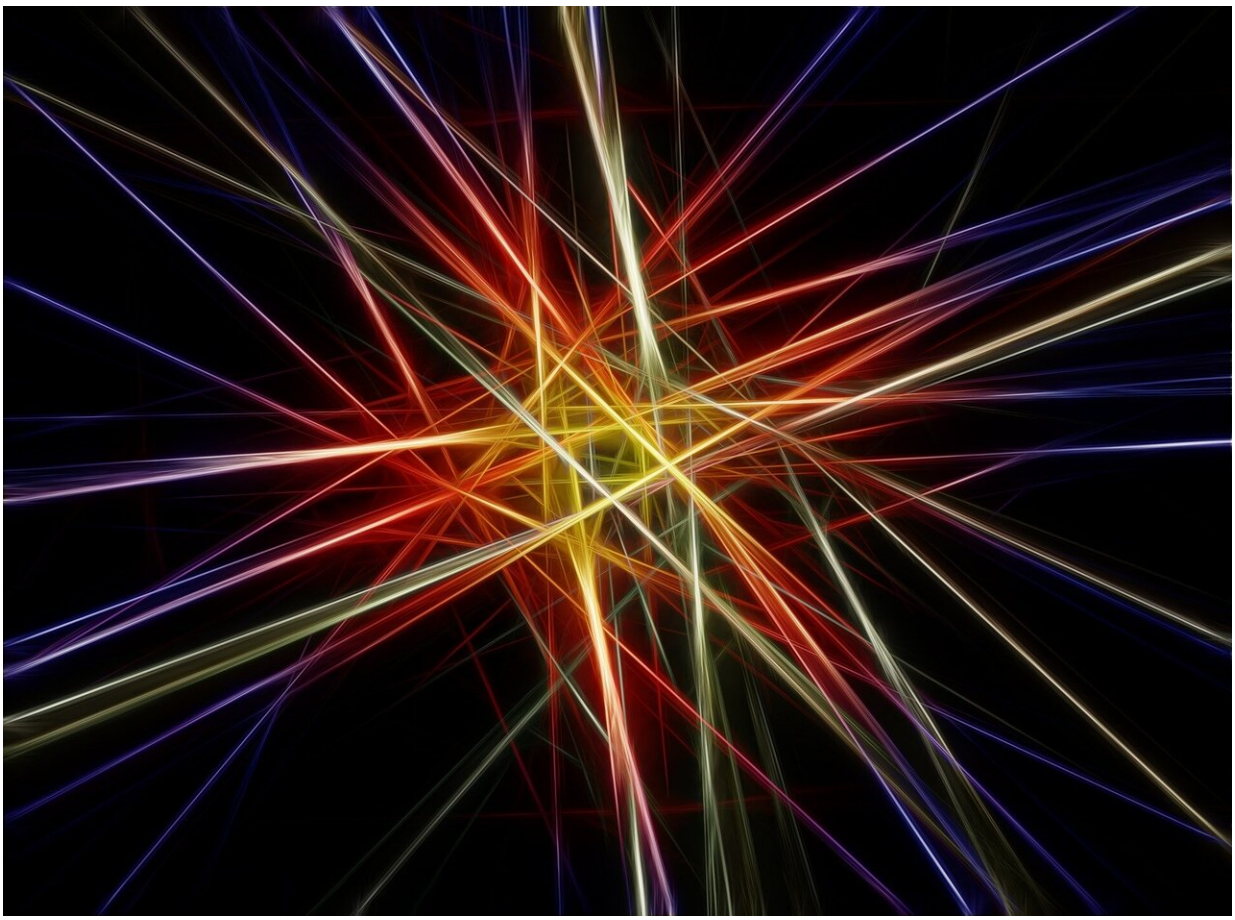

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Researchers at MESA+ Institute for Nanotechnology developed a tool that can measure the size of a plasma source and the color of the light it emits simultaneously. "Measuring both at the same time enables us to further improve lithography machines for smaller, faster and improved chips." The article is highlighted as an Editor's pick in *Optics Letters*.

Lithography machines are central to the process of making the microchips that are needed for almost all our electronic devices. To produce the smallest chips, these machines need precision-engineered lenses, mirrors and light sources. "Traditionally, we could only look at the amount of light produced, but to further improve the chipmaking process, we also want to study the colors of that light and the size of its source," explains Muharrem Bayraktar, assistant professor at the XUV Optics Group.

The extreme ultraviolet light is emitted by a plasma source, produced by aiming lasers at metal droplets. With sets of special mirrors, this light is aimed at a silicon wafer to create the smallest microchips imaginable. "We want to make the plasma as small as possible. Too large and you 'waste' a lot of light because the mirrors cannot catch all the light," says Bayraktar.

In addition to the size, the emitted color is also important. "The plasma does not only emit extreme ultraviolet light, but also other colors," says Bayraktar. With this new tool, the researchers can look at the size and color simultaneously. This makes it possible to investigate the relation between the size of a plasma source and the color of the light it emits.

For this new tool, the researchers used a combination of tapered zone plates and transmission grating. Both were produced at MESA+. Tapered zone plates are specialized optical components that manipulate extreme ultraviolet light to precisely image the plasma source. The transmission grating disperses the light into its individual colors, making it possible to

individually measure them.

**More information:** Yahia Mostafa et al, Extreme ultraviolet broadband imaging spectrometer using dispersion-matched zone plates, *Optics Letters* (2023). DOI: 10.1364/OL.496995