A REVOLUTIONARY LASER TECHNOLOGY HAS BEEN DEVELOPED

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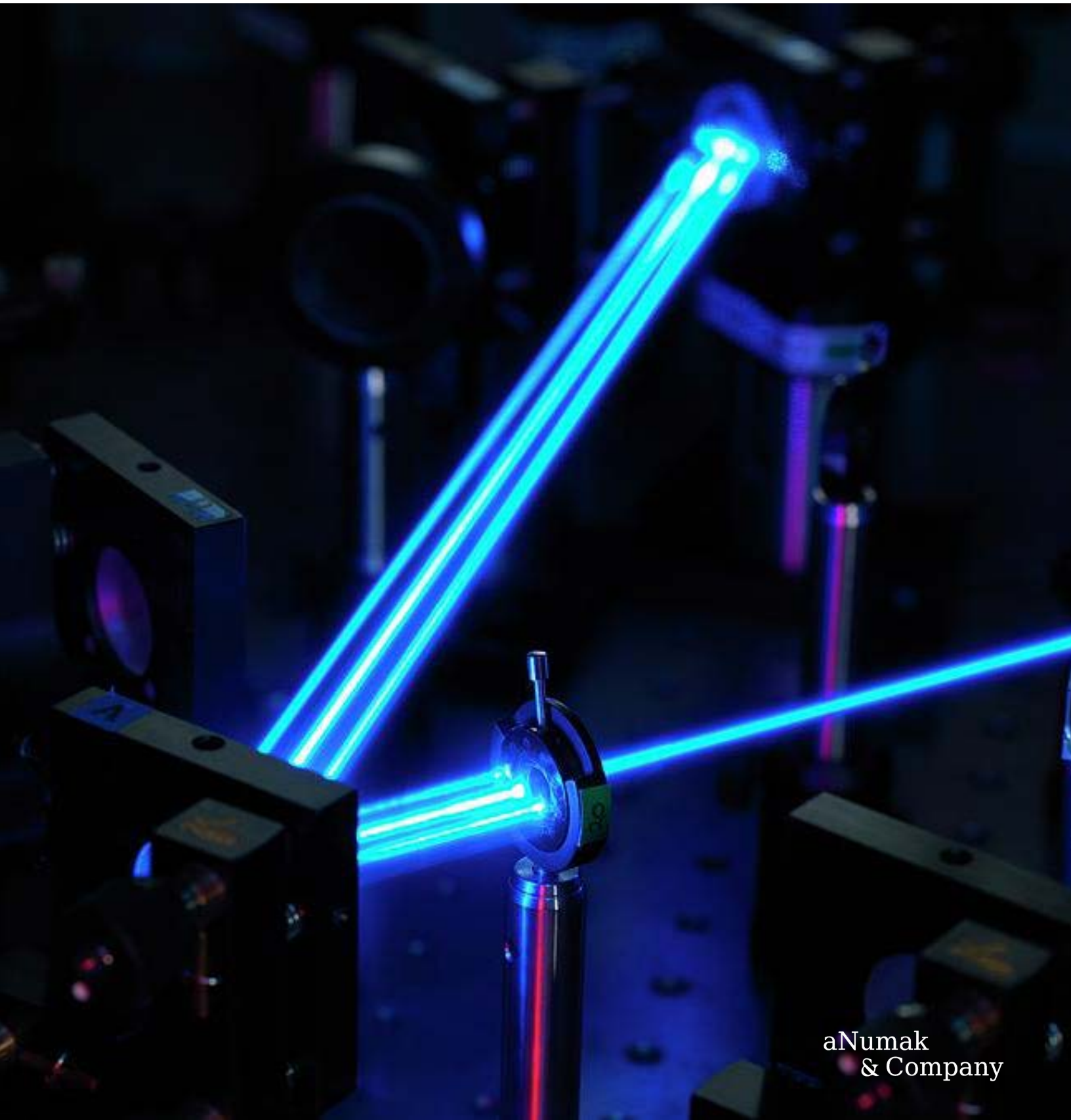

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A laser emits light more consistently than other light sources. In addition, spatial coherence allows a laser to be focused on a tight spot, enabling laser cutting and lithography applications.

Spatial coherence enables applications such as laser pointers to be collimated (collimation) of a laser beam over long distances.

Temporal coherence can produce a pulse as short as one femtosecond. Among the many applications, lasers are used in optical disk drives, laser printers, and barcode scanners;

DNA sequencing tools, fiber optic and free field optical communication, laser surgery, skin treatments, cutting and welding materials; are used in military and law enforcement devices to mark targets, measure range and speed, and recreational laser lighting displays.

Scientists have announced that they have taken a big step towards transforming materials using only light.

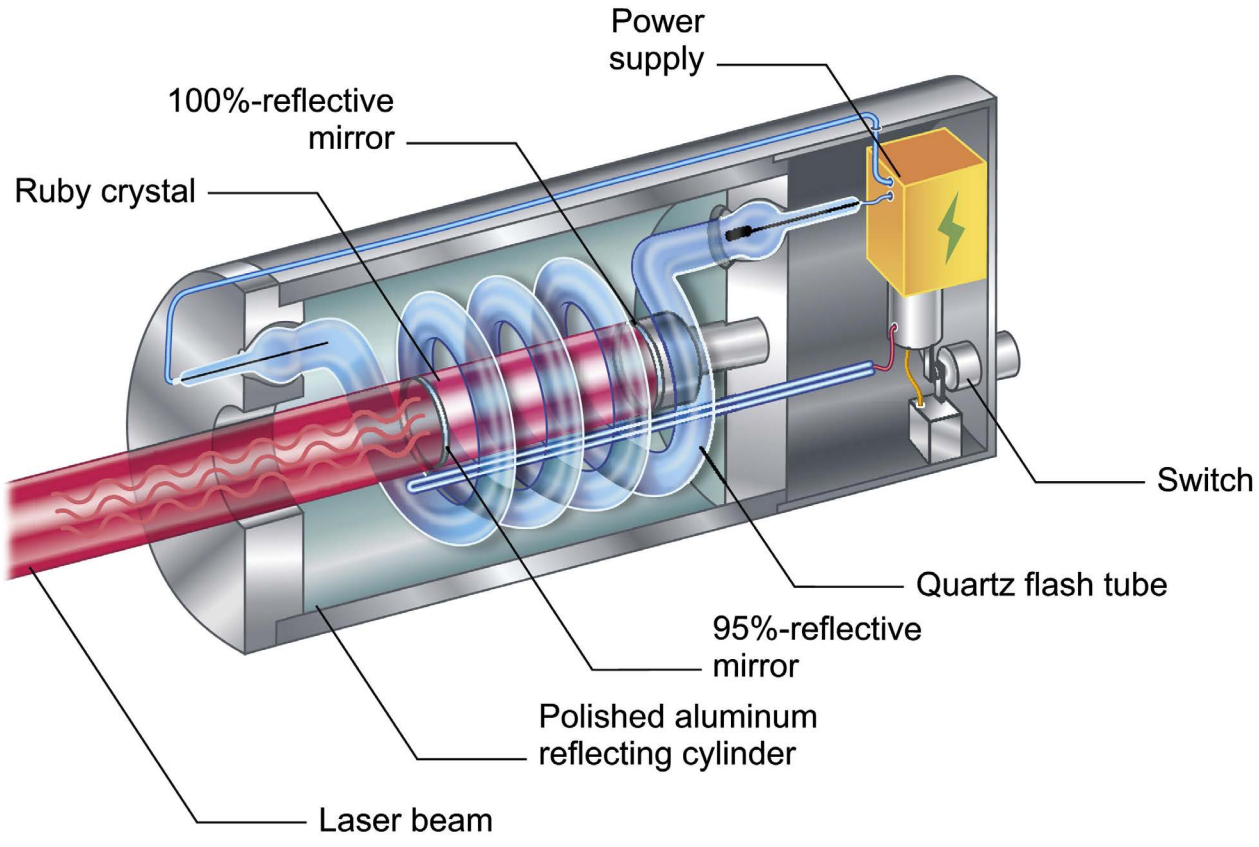
The groundbreaking new development is a step toward making windows instantly turn into mirrors, high-speed computers that use light instead of electricity, and much more.

"These tools can enable you to transform the electronic properties of materials using a lamp–on the switch," said David Hsieh, Caltech Professor of Physics.

However, the lasers overheated the materials, created a problem, and limited the technologies.

Scientists have long hoped to use lasers for shaping and chipping materials. But they were blocked by the heat generated during the process, which damaged everything the lasers were trying to process.

Components of the first ruby laser



"The lasers needed in these experiments are potent, so it's hard that they don't generate heat and don't damage materials," said Junyi Shan, lead author of the study.

By fine–tuning the laser to solve this problem, scientists discovered a perfect range so that the material's properties could be changed without that heat being produced.

They also realized that this is reversible, so the material returns to its original state when the laser is turned off.

Scientists have struggled for years to develop such a system, the foundation of which dates back to the 1960s. But now, they have successfully done so, enabling it to be put into practice.

This could enable the creation of new kinds of materials that may never have been possible before, such as exotic quantum magnets.

"In principle, this method can change the optical, magnetic, and many other properties of materials," Shan said.

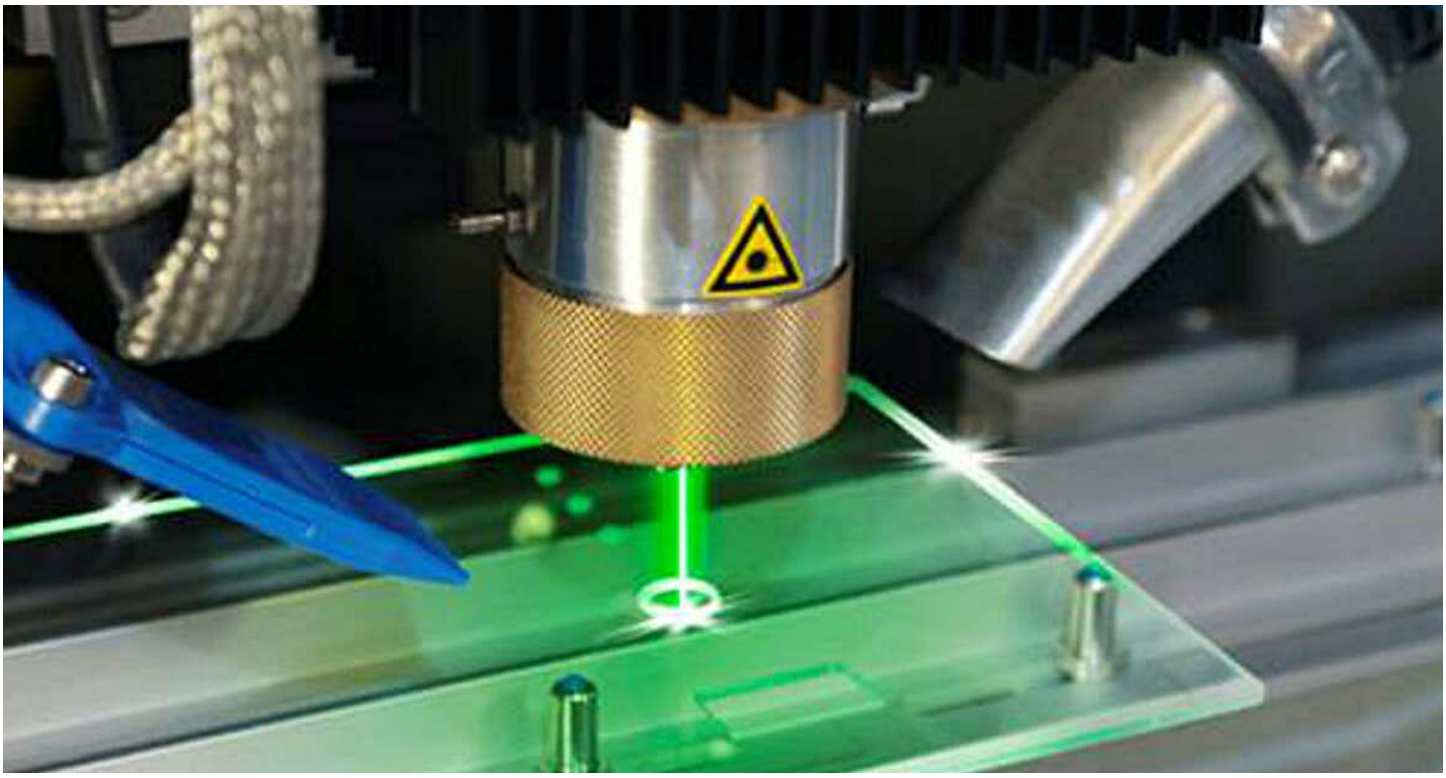
It's a different way of doing materials science. Instead of creating new materials to create other properties, we can take just one material and ultimately give it a wide range of beneficial properties.

Laser Surface Treatment

It is claimed that laser surface treatment has enormous growth potential in laser material processing. Laser surface treatments offer various possibilities to achieve the desired surface properties.

Laser technology is used to reduce wear and increase the fatigue resistance of machine components. It is used effectively in hard and possibly inexpensive base materials where complex surface layers are needed, and measurable thermal degradation is not allowed.

The principle of laser surface treatment is modifying a surface due to the interaction between a coherent light beam of high power density and the texture in a specified atmosphere (vacuum, shielding, or process gases).



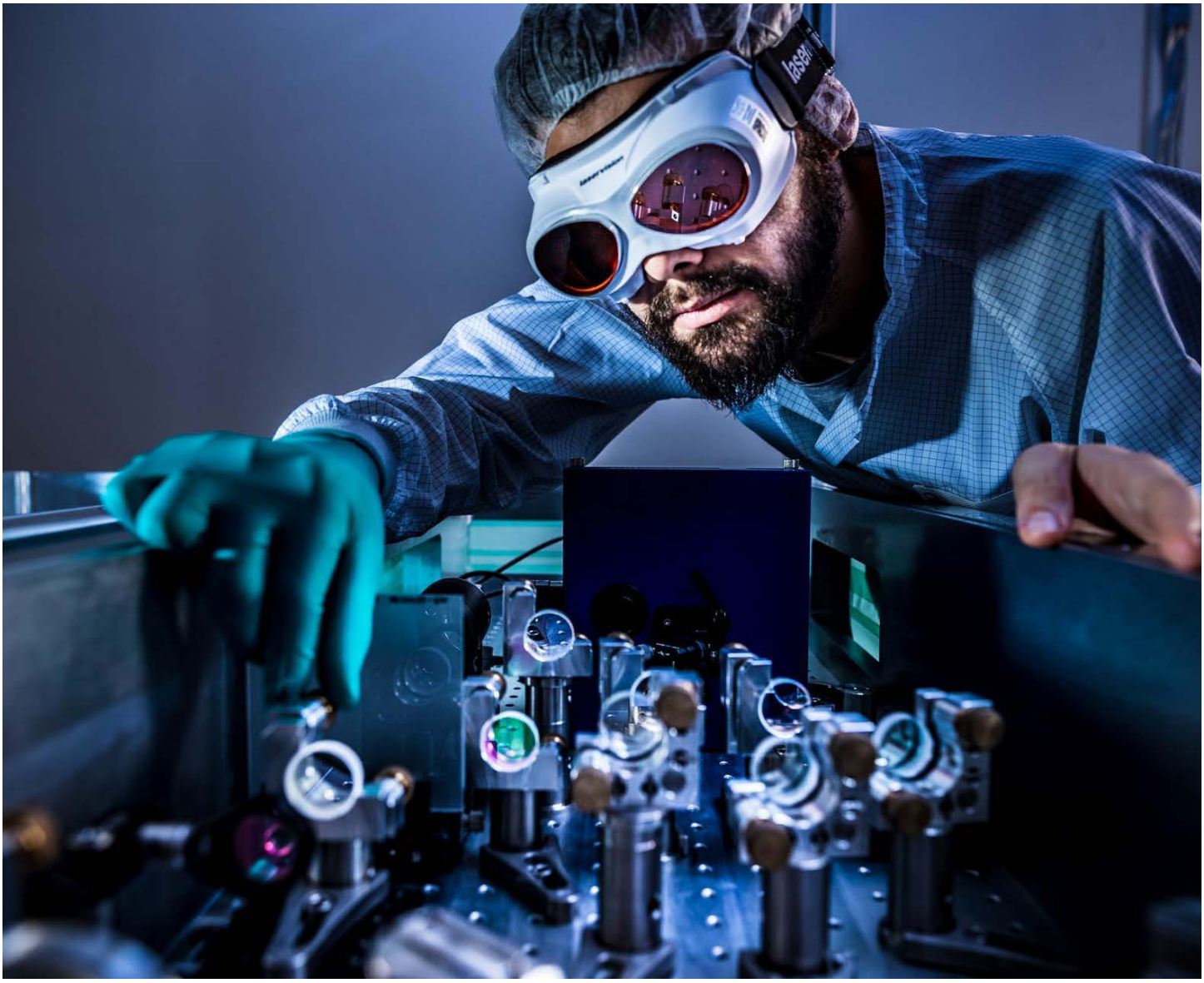
The light produced in a resonator is directed to the surface of a sample via an optical transmission system (mirror systems or fiber optics).

Starting from a given average optical output power, the required power density, which is the ratio of power to the focused spot area, and the intensity distribution along the beam are modified by beam focusing and beam shaping optics such as glasses, mirrors, scanning units or beam integrators.

As the laser beam is moved over the workpiece, a trace pattern can be sequentially created on the surface of a part. Next, the interaction time is determined by the beam's cross–section and the feed rate.

Depending on the type of process and the workpiece geometry, translation stages, portal systems, or robots may be used to achieve such relative motion.

A suitable system for the beam and workpiece primarily depends on precision, machining speed, and handling of the masses. In addition, the time required to fix and align the workpiece and the investment costs is other vital considerations.



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