New Applications for Femtosecond Laser

The Basque Research Centre CIC microGUNE is researching new applications for the technology known as femtosecond laser. This kind of laser allows the processing of materials with an unachievable precision for other techniques. Working inside transparent materials without damaging their surface, making more sensitive sensors for chips than the present ones, or treating metals in a more precise way than the conventional lasers are some of its possible applications.

The aim of CIC microGUNE is the generation of knowledge in an area with great growth potential, due to its wide applicability, in different industries with very precise production processes. The work with femtosecond laser is an example of the big bet of the center to promote the competitiveness of the Basque industry through the use of microtechnologies.

The femtosecond laser is used in surgeries such as the ones for myopia or cataract, thanks to its capacity to go through tissues without damaging them. However, it is not still used in industry, because its incidence is very different depending on the material and their exact effects are not still known precisely.

CIC microGUNE's purpose is to determine exactly how it interacts under different conditions with different materials, and accordingly, to determine which possible applications it could have in industry.

"Nowadays, this technology is only used in research centers. It will be ready to be used in industry in two or three years" states Ainara Rodríguez, responsible of the research with femtosecond laser in CIC microGUNE. "No doubt, its countless capabilities will allow industry to add value to their products" She adds.

Possible Applications

One of its possible applications is the production of embedded structures of transparent materials, such as glass or plastic. Thanks to the possibility of this technology of working inside the materials without damaging the surface, it would be possible to generate tridimensional structures. This would allow the generation of chips or lens embedded in a glass block, for example. This has some advantages like being hermetic and difficulty for falsification.
Another clear use is the production of better sensors for chips.

The capacity of detection of the sensors is directly proportional to its sensing surface. The femtosecond laser is able to generate very precise reliefs of microscopic sizes. These reliefs increase the sensing surface, which offers bigger detection capacity. Thanks to this technique, therefore, more precise and smaller sensors could be generated.

This new generation laser could also be a technology of great interest for the metal industry and derivative. It is capable of doing cuts with high accuracy and with small affectation in its surface, as it is capable of taking material out without heating it, and therefore, minimizing the affectation on it. This capacity would also be useful for polymeric materials such as plastics or resins.

**Femtosecond Laser**

The femtosecond lasers emit a beam of light with very short times that achieve very high power with great accuracy. The light emission pulses have a hundred femtosecond duration (a femtosecond is a thousand billion part of a second.)

"It is said that when the laser was invented they told that it was a solution waiting for a problem, because in that moment they didn't know possible uses. The femtosecond laser is even more precise and it offers bigger potentialities, so we could be in the same case. For the moment, we know that it can be applied to different fields. We are already researching in some of them" says Rodriguez.

In fact, CIC microGUNE already employs this technology in some of its research projects, such as the Predetect project financed by the Basque Government, which is trying to develop a device to detect pathogens on food; the miDIAG project, around the development of microtechnology for rapid diagnosis, also funded by the autonomic government.
More information:
http://cicmicrogune.blogspot.de/