

Fine-tuning lasers to destroy blood-borne diseases like AIDS

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Physicists in Arizona State University have designed a revolutionary laser technique which can destroy viruses and bacteria such as AIDS without damaging human cells and may also help reduce the spread of hospital infections such as MRSA.

The research, published on Thursday November 1 in the Institute of Physics' *Journal of Physics: Condensed Matter*, discusses how pulses from an infrared laser can be fine-tuned to discriminate between problem microorganisms and human cells.

Current laser treatments such as UV are indiscriminate and can cause ageing of the skin, damage to the DNA or, at worst, skin cancer, and are far from 100 per cent effective.

Femtosecond laser pulses, through a process called Impulsive Stimulated Raman Scattering (ISRS), produces lethal vibrations in the protein coat of microorganisms, thereby destroying them. The effect of the vibrations is similar to that of high-pitched noise shattering glass.

The physicists in Arizona have undertaken experiments to show that the coherent vibrations excited by infrared lasers with carefully selected wavelengths and pulse widths do no damage to human cells, most likely because of the different structural compositions in the protein coats of human cells vis a vis bacteria and viruses.

Professor K. T. Tsen from Arizona State University said, "Although it is

not clear at the moment why there is a large difference in laser intensity for inactivation between human cells and microorganisms such as bacteria and viruses, the research so far suggests that ISRS will be ready for use in disinfection and could provide treatments against some of the worst, often drug-resistant, bacterial and viral pathogens.”

Femtosecond lasers could find immediate application in hospitals as a way to disinfect blood supply or biomaterials and for the treatment of blood-borne diseases such as AIDS and Hepatitis.

Source: Institute of Physics

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