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Strong Terahertz Wave Generation from Liquid Water

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Generating terahertz radiation from liquid water has long been considered to be impossible due to strong absorption. Two recent works reported terahertz generation from water, but the mechanism is not clear and the efficiency demands to be enhanced. We show experimentally that strong terahertz radiation is generated from a water line/column irradiated by a mJ laser beam. The strength is 100–fold higher than that produced from air with efficiency approaching 10−4. We attribute the mechanism to the laser–ponderomotive–force–induced current with the symmetry broken around the column interface. This mechanism can explain our following observations: the radiation can be generated only when the laser propagation axis deviates from the column center; the deviation determines its field strength and polarity; it is always p–polarized whether the laser is p– or s–polarized. This study presents a possible terahertz generation mechanism in water and also provides a simple and efficient scheme of table–top terahertz sources.

SHORT BIO:

Liang–liang Zhang is currently a professor at the Department of Physics, Capital Normal University, Beijing China. She received her Ph.D. degree in instruments science and technology from the Beijing Institute of Technology in 2008. She was a visiting scholar at Rensselaer Polytechnic Institute and University of Rochester in USA. Her research field is terahertz spectroscopy and imaging. She is a topical editor for Journal of the Optical Society of America B (JOSA B)..

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