Characterization of aqueous alcohol solutions in bottles with THz reflection spectroscopy -
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We demonstrate a method based on self-referenced THz time-domain spectroscopy for inspection of aqueous liquids, and in particular alcohol solutions, inside closed containers. We demonstrate that it is possible to determine the alcohol content of an aqueous solution, and that liquids can be classified as either harmless or inflammable. The method operates in reflection mode with the result that liquids opaque to THz radiation can be characterized with little influence of the bottle shape. The method works with plastic bottles as well as glass bottles, with absorption of THz radiation by the plastic or the glass being the limiting factor. The reflection mode allows for automatic control of the validity of the measurement. The method will be useful in liquid scanning systems at security checkpoints.

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