Terahertz reflection spectroscopy of Debye relaxation in polar liquids

Terahertz (THz) radiation interacts strongly with the intermolecular hydrogen-bond network in aqueous liquids. The dielectric properties of liquid water and aqueous solutions in the THz spectral region are closely linked to the microscopic dynamics of the liquid solution, and hence THz spectroscopy offers an important insight into fundamental intermolecular interactions in polar liquids. At the same time, the strong and characteristic interaction between THz radiation and liquids offers a methodology for the classification of liquids inside containers, and hence the THz region is suitable for remote detection of some of the properties of bottled liquids. Here we present a review of THz spectroscopy and modeling of water-ethanol mixtures, and establish a link between the dielectric function of water-ethanol mixtures and some of their thermodynamic properties. We then review how the knowledge of the dielectric function of aqueous mixtures can be used for inspection of liquids inside bottles. Finally we draw up some of the limits to the applicability of THz reflection spectroscopy in the identification of dangerous liquids.

General information
State: Published
Organisations: Terahertz Technologies and Biophotonics, Department of Photonics Engineering
Contributors: Møller, U., Cooke, D., Tanaka, K., Jepsen, P. U.
Pages: A113-A125
Publication date: 2009
Peer-reviewed: Yes

Publication information
Journal: Optical Society of America. Journal B: Optical Physics
Volume: 26
Issue number: 9
ISSN (Print): 0740-3224
Ratings:
BFI (2018): BFI-level 1
Web of Science (2018): Indexed yes
BFI (2017): BFI-level 1
Scopus rating (2017): CiteScore 1.97 SJR 0.859 SNIP 0.875
Web of Science (2017): Impact factor 2.048
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 1
Scopus rating (2016): CiteScore 1.81 SJR 0.85 SNIP 0.936
Web of Science (2016): Impact factor 1.843
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 1
Scopus rating (2015): CiteScore 1.78 SJR 0.963 SNIP 0.923
Web of Science (2015): Impact factor 1.731
BFI (2014): BFI-level 1
Scopus rating (2014): CiteScore 2.09 SJR 1.167 SNIP 1.137
Web of Science (2014): Impact factor 1.97
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 1
Scopus rating (2013): CiteScore 2.33 SJR 1.348 SNIP 1.286
Web of Science (2013): Impact factor 1.806
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 1
Scopus rating (2012): CiteScore 2.2 SJR 1.522 SNIP 1.28
Web of Science (2012): Impact factor 2.21
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed yes
BFI (2011): BFI-level 1
Scopus rating (2011): CiteScore 2.33 SJR 1.526 SNIP 1.499
Web of Science (2011): Impact factor 2.185