

(1) Remote Chemical Sensing and Recognition, (2) Ultrasonic Reading Machine Based on Reverse Photoacoustic Effect

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Technology Summary

(1) A remote chemical sensing and recognition approach is developed on a new spectroscopic effect: reverse photoacoustic effect. The light absorption increases the local temperature of a sample, which in turn changes the phase angle of a reflected or transmitted ultrasonic wave. The sample's chemical nature is then remotely determined from the wavelength-dependent phase change spectrum obtained using an array of light filters. The light source and transducers can be arranged to enable compact device construction and easy field operation. (2) An ultrasonic reading machine is developed to help visible-impaired people read black-and-white features and colored features. The features are illuminated with white light and filtered light for black features on white paper and colored features. Depending on the light absorption abilities of features on paper, the phase angle of a reflected or transmitted ultrasonic wave will change as the result of light-induced temperature change. The phase change occurs fast as the result of light absorption and heat generation, and the readable feature size can be reduced by narrowing the ultrasonic beam using an aperture. The ultrasonic reading machine offers numerous advantages in reading non-planar or non-touchable feature, such as those attached on solid stands.

Inventor

THUNDAT, THOMAS G
Life Sciences Division

Licensing Contact

SPECK, ROBERTA R
UT-Battelle, LLC
Oak Ridge National Laboratory
Rm 141, Bldg 4500N, MS: 6196
1 Bethel Valley Road
Oak Ridge, TN 37831

Office Phone: (865) 576-4680

E-mail: SPECKRR@ORNL.GOV

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