Noninvasive particle sizing using camera-based diffuse reflectance spectroscopy

Diffuse reflectance measurements are useful for noninvasive inspection of optical properties such as reduced scattering and absorption coefficients. Spectroscopic analysis of these optical properties can be used for particle sizing. Systems based on optical fiber probes are commonly employed, but their low spatial resolution limits their validity ranges for the coefficients. To cover a wider range of coefficients, we use camera-based spectroscopic oblique incidence reflectometry. We develop a noninvasive technique for acquisition of apparent particle size distributions based on this approach. Our technique is validated using stable oil-in-water emulsions with a wide range of known particle size distributions. We also measure the apparent particle size distributions of complex dairy products. These results show that our tool, in contrast to those based on fiber probes, can deal with a range of optical properties wide enough to track apparent particle size distributions in a typical industrial process.

General information
State: Published
Organisations: Department of Applied Mathematics and Computer Science, Image Analysis & Computer Graphics, Technical University of Denmark, Firmenich SA
Pages: 3840-3846
Publication date: 2016
Peer-reviewed: Yes

Publication information
Journal: Applied Optics
Volume: 55
Issue number: 14
ISSN (Print): 1559-128X
Ratings:
BFI (2018): BFI-level 1
Web of Science (2018): Indexed yes
BFI (2017): BFI-level 1
Scopus rating (2017): CiteScore 1.84 SJR 0.715 SNIP 1.137
Web of Science (2017): Impact factor 1.791
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 1
Scopus rating (2016): CiteScore 1.61 SJR 0.695 SNIP 1.124
Web of Science (2016): Impact factor 1.65
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 1
Scopus rating (2015): CiteScore 1.66 SJR 0.837 SNIP 1.218
Web of Science (2015): Impact factor 1.598
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 1
Scopus rating (2014): CiteScore 2.04 SJR 1.047 SNIP 1.487
Web of Science (2014): Impact factor 1.784
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 1
Scopus rating (2013): CiteScore 1.98 SJR 0.985 SNIP 1.584
Web of Science (2013): Impact factor 1.649
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 1
Scopus rating (2012): CiteScore 1.79 SJR 1.042 SNIP 1.468
Web of Science (2012): Impact factor 1.689
ISI indexed (2012): ISI indexed no
BFI (2011): BFI-level 1
Scopus rating (2011): CiteScore 1.92 SJR 1.055 SNIP 1.744
Web of Science (2011): Impact factor 1.748