

FINAL
DRAFT

INTERNATIONAL
STANDARD

ISO/FDIS
20480-5

ISO/TC 281

Secretariat: JISC

Voting begins on:
2023-08-23

Voting terminates on:
2023-10-18

Fine bubble technology — General principles for usage and measurement of fine bubbles —

Part 5: Shelled bubble vocabulary

iTeh Standards
(<https://standards.iteh.ai>)
Document Preview

[ISO/FDIS 20480-5](#)

<https://standards.iteh.ai/catalog/standards/sist/334b2d6f-6cb4-4968-83ff-c42fbc25c4b/iso-fdis-20480-5>

RECIPIENTS OF THIS DRAFT ARE INVITED TO SUBMIT, WITH THEIR COMMENTS, NOTIFICATION OF ANY RELEVANT PATENT RIGHTS OF WHICH THEY ARE AWARE AND TO PROVIDE SUPPORTING DOCUMENTATION.

IN ADDITION TO THEIR EVALUATION AS BEING ACCEPTABLE FOR INDUSTRIAL, TECHNOLOGICAL, COMMERCIAL AND USER PURPOSES, DRAFT INTERNATIONAL STANDARDS MAY ON OCCASION HAVE TO BE CONSIDERED IN THE LIGHT OF THEIR POTENTIAL TO BECOME STANDARDS TO WHICH REFERENCE MAY BE MADE IN NATIONAL REGULATIONS.



Reference number
ISO/FDIS 20480-5:2023(E)

© ISO 2023

iTeh Standards
(<https://standards.iteh.ai>)
Document Preview

[ISO/FDIS 20480-5](#)

<https://standards.iteh.ai/catalog/standards/sist/334b2d6f-6cb4-4968-83ff-c42fbc25c4b/iso-fdis-20480-5>



COPYRIGHT PROTECTED DOCUMENT

© ISO 2023

All rights reserved. Unless otherwise specified, or required in the context of its implementation, no part of this publication may be reproduced or utilized otherwise in any form or by any means, electronic or mechanical, including photocopying, or posting on the internet or an intranet, without prior written permission. Permission can be requested from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Email: copyright@iso.org
Website: www.iso.org

Published in Switzerland

Contents

	Page
Foreword	iv
Introduction	v
1 Scope	1
2 Normative references	1
3 Terms and definitions	1
3.1 Terms related to shelled bubble.....	1
3.2 Terms related to shelled bubble categorization.....	4
3.3 Terms related to generation and characterization of shelled bubbles.....	5
Index	6

iTeh Standards
(<https://standards.itih.ai>)
Document Preview

[ISO/FDIS 20480-5](https://standards.itih.ai/catalog/standards/sist/334b2d6f-6cb4-4968-83ff-c42fbc25c4b/iso-fdis-20480-5)

<https://standards.itih.ai/catalog/standards/sist/334b2d6f-6cb4-4968-83ff-c42fbc25c4b/iso-fdis-20480-5>

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO document should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

ISO draws attention to the possibility that the implementation of this document may involve the use of (a) patent(s). ISO takes no position concerning the evidence, validity or applicability of any claimed patent rights in respect thereof. As of the date of publication of this document, ISO had not received notice of (a) patent(s) which may be required to implement this document. However, implementers are cautioned that this may not represent the latest information, which may be obtained from the patent database available at www.iso.org/patents. ISO shall not be held responsible for identifying any or all such patent rights.

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 281, *Fine bubble technology*.

A list of all parts in the ISO 20480 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

Fine bubbles are the bubbles of a size typically less than 100 μm . Fine bubbles without a shell have recently seen growth in their applications in both industrial and biomedical fields, especially wastewater treatment, food processing, ultrasound imaging and medicine.

This document recognizes general principles of the definition of fine bubbles. However, it is to define the fine bubbles with shell materials encapsulation at the gas-liquid interface, resulting longer stability and controllability when application.

The shelled gas bubbles have shown extraordinary potential when used in the biomedical and food industries, especially in the applications of drug delivery and ultrasonic imaging. Shelled bubbles combine the unique responsiveness of bubbles to ultrasound and the specific functionalization of shells.

Bubbles have a strong acoustic impedance, which allows them to reflect sound waves far more efficiently than the surrounding fluid and biological tissue. Therefore, the use of bubbles in ultrasound imaging can effectively enhance the reflection of ultrasound, so as to obtain a higher image resolution. Contrast-enhanced ultrasound can be used to observe blood perfusion in an organ, to measure the flow rate of blood in the heart or other organs, and for a number of other purposes.

Different types of materials can also be chosen to endow bubbles with different functions, such as specific targeting, and carriers for drugs, genes and other contrast agents for multimodal imaging. Besides, bioactive gases such as oxygen gas, nitric oxide, hydrogen can be stored in the shelled bubble. Bubbles coated with nutritional ingredients or drugs can help to improve the nutrition or act as a medicinal aid in food.

When a gaseous core is encapsulated with shell materials encapsulated at the gas-liquid interface, it will result in longer stability and increased controllability when applied. With the shell, the size distribution of fine bubbles can be further controlled. The bioactive gasses (e.g. oxygen, hydrogen, nitric oxide) and/or soluble gases (e.g. carbon dioxide, sulfur dioxide, hydrogen sulfide, ozone) bubbles can be obtained in the solution for a longer duration time. Other functions of fine bubbles can be also tuned for specific applications. There is no document for distinction between a shelled bubble and nanoparticle or a fine bubble without a shell.

This document specifies terms, definitions and categories of a shelled bubble. Shelled bubbles accelerate further applications in the biomedical field, and also initiate new applications in other fields, such as energy storage, the food industry, environmental technology, agriculture and separation technologies. Development of appropriate general principles for usage, measurement and vocabulary for shelled bubbles is therefore critical to business trade or product acceptance by hospitals and consumers.

