



UNIVERSITI  
TEKNOLOGI  
MARA

# The Future & Wonders of Floating & Living CONCRETES



HAMIDAH MOHD SAMAN

UiTM  
Professorial  
Lecture

# **The Future & Wonders of Floating & Living CONCRETES**

*Hamidah Mohd Saman*

**PENERBIT**  **PRESS**  
UNIVERSITI TEKNOLOGI MARA

© UiTM Press, UiTM 2022

All rights reserved. No part of this publication may be reproduced, copied, stored in any retrieval system or transmitted in any form or by any means; electronic, mechanical, photocopying, recording or otherwise; without prior permission in writing from the Director of UiTM Press, Universiti Teknologi MARA, 40450 Shah Alam, Selangor Darul Ehsan, Malaysia.

E-mail: [penerbit@uitm.edu.my](mailto:penerbit@uitm.edu.my)

UiTM Press is a member of  
**MALAYSIAN SCHOLARLY PUBLISHING COUNCIL**

Perpustakaan Negara Malaysia      Cataloguing-in-Publication Data

Hamidah Mohd. Saman

The Future & Wonders of Floating & Living Concretes/HAMIDAH MOHD SAMAN.  
(Professorial Lecture UiTM)

ISBN 978-967-363-824-6

1. Concrete.
  2. Concrete products.
  3. Mortar.
  4. Government publications--Malaysia.
- I. Title. II. Series.  
620.136

Cover Design : Siti Suhaini Mazlan

Typesetting : Mohd Fadhel Mohd Drus

Printed in Malaysia by : UiTM Printing Centre

College of Creative Arts Studies  
Universiti Teknologi MARA  
40450 Shah Alam  
Selangor

# CONTENTS

---

---

<i>List of Figures</i>	xi
<i>List of Tables</i>	xix
<i>Preface</i>	xxiii
<i>Acknowledgement</i>	xxv
<i>Introduction</i>	xxvii

<b>Chapter One: Concrete wonder, its evolution and challenges</b>	1
1.1 Concrete as evergreen construction material	1
1.2 Concrete evolution	4
1.3 Concrete challenges for future	7
1.3.1 Deterioration mechanism	8
1.3.2 Environmental and sustainability	9
1.4 Summary	11

<b>Chapter Two: Wonders of concrete Part I: floating concrete</b>	13
2.1 What is lightweight concrete?	13
2.2 Foamed concrete	14
2.3 Materials for foamed concrete	15
2.4 Mix proportion of basic foamed concrete	17
2.5 Preparation and casting of foamed concrete specimens	20

# PREFACE

---

---

This book addresses two (2) wonders of concrete: how concrete can be a floating material and how living things can survive in concrete to make it durable. Concrete can be a lightweight material by introducing an expanding agent and increasing its volume. The small bubbles uniformly entrapped reduce the weight of concrete up to a lower density than the density of water, making it floats. An in-house developed spread-sheet can produce a mix proportioning of lightweight concrete with designated density and compressive strength.

Meanwhile, bacteria can be grown in the concrete opening (crack) if they are supplied with sufficient food, and the precipitation from the biomineralisation process fills up the fissures and cracks to prolong the service life of the concrete. Several ways are looked for to accelerate urease activity to promote the biomineralisation process, which leads to calcite formation that can fill up the cracks in new and existing concretes.

Findings from experimental and field works are included in this book to demonstrate the performance with various formulations of lightweight concrete, namely foamed concrete and treatment of concrete crack using bacteria. It is not complete when discussing concrete without bringing up these two (2) issues: the environment and sustainability, and this book is unexceptional. The construction industry itself contributes