An ACI Technical Publication

SYMPOSIUM VOLUME

12th ACI/RILEM International Conference on Cementitious Materials and Alternative Binders for Sustainable Concrete

Editor:
Arezki Tagnit-Hamou

American Concrete Institute
Always advancing

12th ACI/RILEM International Conference on Cementitious Materials and Alternative Binders for Sustainable Concrete (ICCM2024)

Sponsored by
ACI, RILEM, Université de Sherbrooke,
Université Toulouse III, CRIB, LMDC Toulouse

June 23-26, 2024
Toulouse, France

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SP-362

First printing, June 2024

Cover photo courtesy of Ville de Montréal
The Darwin Bridge
2021 ACI Excellence Awards, First Place, Infrastructure

Printed in the United States of America

Editorial production: Susan Esper

ISBN-13: 978-1-64195-250-7

PREFACE

In July of 1983, the Canada Centre for Mineral and Energy Technology of Natural Resources Canada (CANMET), in association with the American Concrete Institute (ACI) and the U.S. Army Corps of Engineers, sponsored a 5-day international conference in Montebello, Quebec, Canada, on the use of fly ash, silica fume, slag, and other mineral by-products in concrete. The conference brought together representatives from industry, academia, and government agencies to present the latest information on these materials and to explore new areas of needed research. Since then, eight other such conferences have been held around the world (Madrid, Trondheim, Istanbul, Milwaukee, Bangkok, Madras, Las Vegas, and Warsaw). The 2007 Warsaw Conference was the last in this series.

In 2017, due to the renewed interest in alternative and sustainable binders and supplementary cementitious materials, a new series was launched by Sherbrooke University (Professor Arezki Tagnit-Hamou), American Concrete Institute (ACI), and the International Union of Laboratories and Experts in Construction Materials, Systems and Structures (RILEM)—in association with a number of other organizations in Canada, the United States and the Caribbean—sponsored the 10th ACI/RILEM International Conference on Cementitious Materials and Alternative Binders for Sustainable Concrete (ICCM2017). The conference was held October 2-4, 2017, in Montréal, Canada. The conference proceedings, containing 50 reviewed papers from more than 33 countries, were published as ACI SP-320.

In 2021, UdeS, ACI, and RILEM, in association with Université de Toulouse and a number of other organizations in Canada, the United States, and Europe sponsored the 11th ACI/RILEM International Conference on Cementitious Materials and Alternative Binders for Sustainable Concrete (ICCM2021). The conference was scheduled to take place in Toulouse, but due to COVID, it was held online June 7-10, 2021. The conference proceedings, containing 53 reviewed papers from more than 21 countries, were published as ACI SP-349.

In 2024, the conference was finally held in-person in Toulouse from June 23 to 26, 2024, with the support of UdeS, ACI, and RILEM in association with Université de Toulouse (Martin Cyr) and a number of other organizations in Canada, the United States, and Europe. The purpose of this international conference was to present the latest scientific and technical information in the field of supplementary cementitious materials and novel binders for use in concrete. The new aspect of this conference is to highlight advances in the field of alternative and sustainable binders and supplementary cementitious materials for the transition to low carbon concrete. The conference proceedings, containing 78 reviewed papers from more than 25 countries, have been published as ACI SP-362.

Thanks are extended to the members of the International Scientific Committee who reviewed the papers. The cooperation of the authors in accepting the reviewers' suggestions and revising their manuscripts accordingly is greatly appreciated. The involvement of the steering committee and the organizing committee is gratefully acknowledged. Special thanks go to Chantal Brien (Université de Sherbrooke) for the administrative work associated with the conference and for processing the manuscripts for both the ACI proceedings and the supplementary volume.

Arezki Tagnit Hamou, Editor
Chairman, 12th ACI/RILEM International Conference on Cementitious Materials and Alternative Binders for Sustainable Concrete (ICCM2024).
Sherbrooke, Canada, 2024

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Interface Properties Between Reactive Magnesia Cement Matrix and GFRP Rebar

Bo Wu and Jishen Qiu

Biography: RILEM member **Jishen Qiu** is an Assistant Professor at the Department of Civil and Environmental Engineering, Hong Kong University of Science and Technology. He received his BS from Dalian University of Technology and PhD from Nanyang Technological University. He is a member of RILEM Committees MBC (Magnesia-based binders in concrete). His research interests include fiber-reinforced cementitious composites, magnesia-based composites, self-healing, and CO_2 sequestration of concrete.

Bo Wu is a PhD candidate at the Department of Civil and Environmental Engineering, Hong Kong University of Science and Technology. He received his BS from Hunan University of Science and Technology, and MS form Shenzhen University. His research interests include fiber-reinforced cementitious composites, fiber surface modification, fiber-matrix interface properties, self-healing, and reactive magnesium cement.

ABSTRACT

Reactive magnesia cement (RMC) is an emerging class of low-alkaline and CO_2-sequestering binder, which can mitigate the deterioration of GFRP reinforcements induced by a high-alkaline environment, e.g., in Portland cement. This study investigated the slip behavior of GFRP rebar embedded in RMC composite, which varies with carbonation depth significantly. The variation of the interfacial bond was determined by a specially designed push-out test of the GFRP core; the variation of the carbonation degree and microstructure was examined by SEM-EDX, XRD, TGA, and acid digestion tests. Both properties demonstrated a similar trend, decreasing rapidly with increasing depth. A new finite element model that considers the depth-dependency of the matrix compositions and the rebar-to-matrix interfacial bond is established. It can predict the constitutive bond-slip behavior of a long GFRP rebar embedded in an RMC composite with non-uniform carbonation.

Keywords: glass fiber reinforced polymer (GFRP), reactive magnesia cement (RMC), bond-slip behavior, non-uniform carbonation, CO_2 sequestration.