



EDITORIAL

SPECIAL ISSUE: Proceedings of MRS Symposium HH on “Structure-Property Relationships in Hardened Cement Pastes and Composites.”
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D.M. Roy, Editor

The papers contained in this issue are refereed papers presented at the Materials Research Society (MRS) annual meeting in Boston, MA, December 2–4, 1996 in a symposium of the above title. The symposium co-chairs were Della M. Roy, Frederik P. Glasser, and Surendra Shah, who were joined in organizational responsibility by the additional members of the program committee, Hiroshi Uchikawa, Ellis Gartner, Barzin Mobasher, and Hans-Wolf Reinhardt. One joint session was also held with Symposium II: Scientific Basis for Nuclear Waste Management (XX), organized by Innes R. Triay and Walter J. Gray.

Although world production of cement is approaching 10^9 tons/year mixed with aggregate, structure-composition-property relationships in cementitious systems are not well defined and are often manipulated using empirical methods. The concept of structure applied to a relatively amorphous cement paste must be broadly defined and include atomic environments and nanoporosity as well as microstructures and interfacial structures at which pastes contact embedded material. These structures are controlled by composition, particle size and packing, water content and the presence of admixtures, mixing, compaction, and cure, and, in service, by reactions with the environment. In principle, these can be quantified by the application of materials science.

The objective of the symposium was to describe advances in synthesis, processing, and characterization to elucidate structure-property-composition relationships and apply knowledge to controlling material properties and long-term performance.

The papers were organized into six different sessions for presentation: 1) influence of microstructure and its development, 2) cements in radioactive waste management, 3) permeability and transport properties, 4) interfacial/transition zone and its effects, 5) methodologies and characterization of cements and composites, and 6) mechanical properties, fracture and strength.

Reflecting the comprehensive nature of the symposium topic, it was decided to distribute the publication among different venues, at the choice of the authors. A number of the papers that were presented appear in the following pages, others in a companion volume in the journal *Advanced Cement-Based Materials*, and a few in the MRS publication on *Scientific Basis for Nuclear Waste Management*.

Although the largest number of papers in this issue fall within category 1) microstructure, the papers are distributed among the six sub-topics and arranged in approximately that order. The specific topics range from numerical modeling, simulation of the effect of geometric changes of microstructure on deformational behavior, particle packing and its effect on properties, simulation of chloridation, the relation between microstructure and macro-properties; to the relation of stress relaxation, desiccation, and water absorption to alkali-silica reaction, the design of novel binder systems for waste solidification, durability—the cross-

road between chemistry and mechanics, and structural properties of calcium-silicate-hydrate by molecular dynamics simulation.

The editor sincerely thanks all the Symposium participants, especially the authors who prepared their manuscripts and patiently revised them, plus the editorial board members and other reviewers who participated in the refereeing of the manuscripts.