

KISHI LAB.

Physical properties of concrete and durability of concrete structure

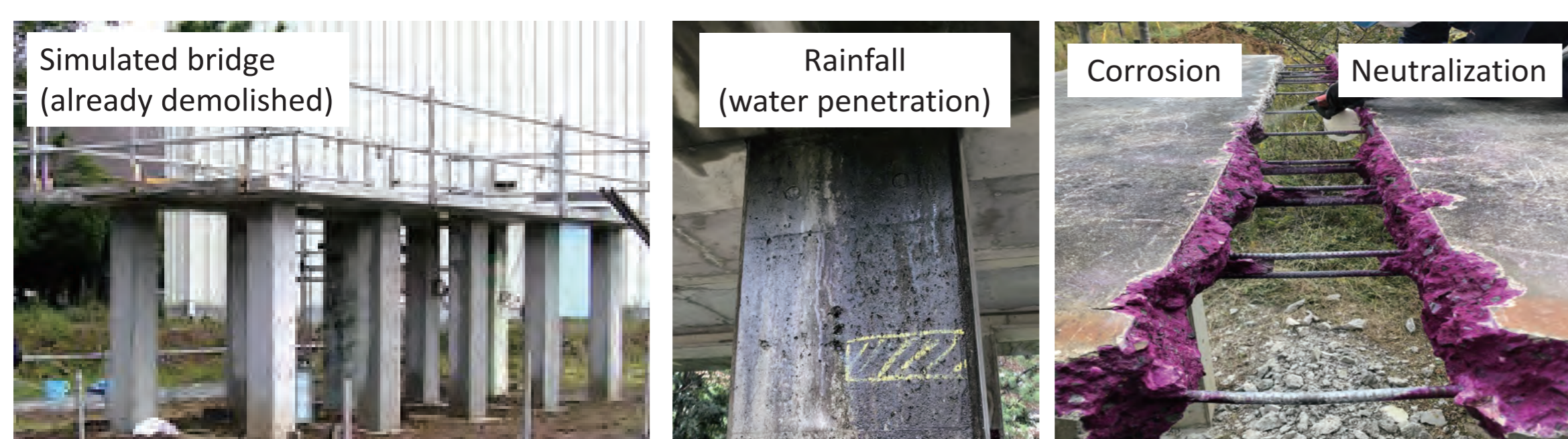


Department of Human & Social Systems

Concrete Engineering and Recycling
 Department of Civil Engineering, Graduate School of Engineering http://wdnsword.iis.u-tokyo.ac.jp/index_e.shtml

We research on (1) physical property, performance assessment, deterioration mechanism of cementitious materials, (2) development and practical application of new material and (3) quality inspection / maintenance of concrete structure.

A new maintenance frame combining water penetration and neutralization



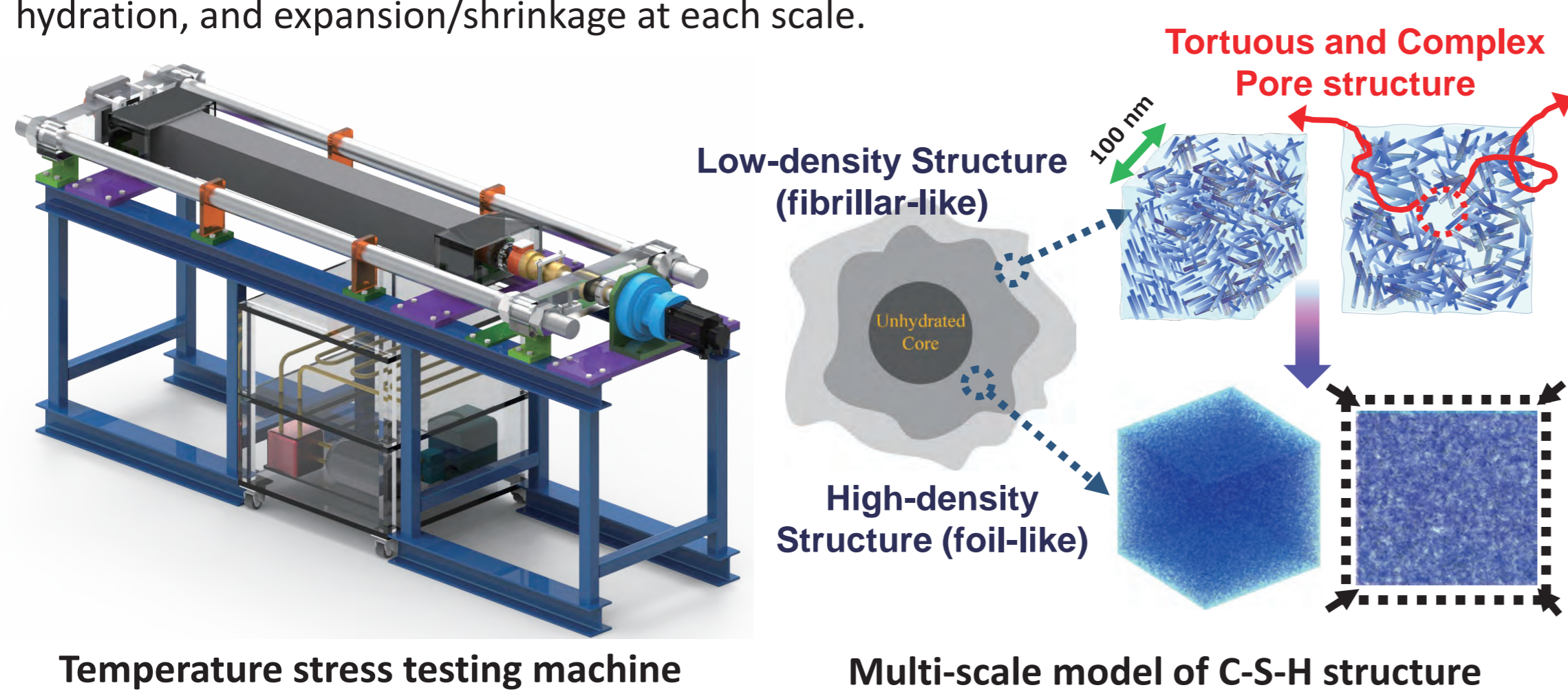
Although the neutralization of concrete is not a sufficient condition for the initiation of rebar corrosion, it has been revealed that it serves as a necessary engineering condition contributing to corrosion, especially when combined with exposure to (acid) rain.

Development of a prediction model for degradation (corrosion cracks and spalling) by calculating the rate and amount of rebar corrosion considering water penetration and the degree of neutralization.

Evaluation on multi-scale shrinkage performance of cementitious materials

Evaluation of the cracking performance of OPC and expansive concrete

Proposal of a multi-scale model to predict macroscopic stress and deformation by elucidating the microscopic stress-deformation mechanism in response to temperature history and by linking the pore structure, moisture movement, densification due to hydration, and expansion/shrinkage at each scale.

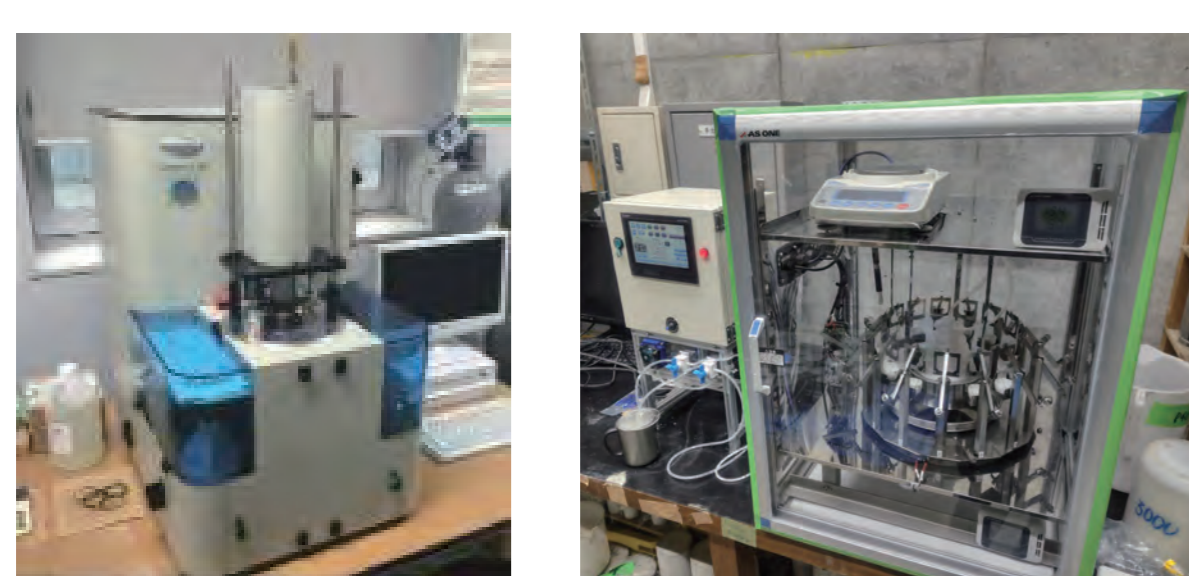


Temperature stress testing machine

Multi-scale model of C-S-H structure

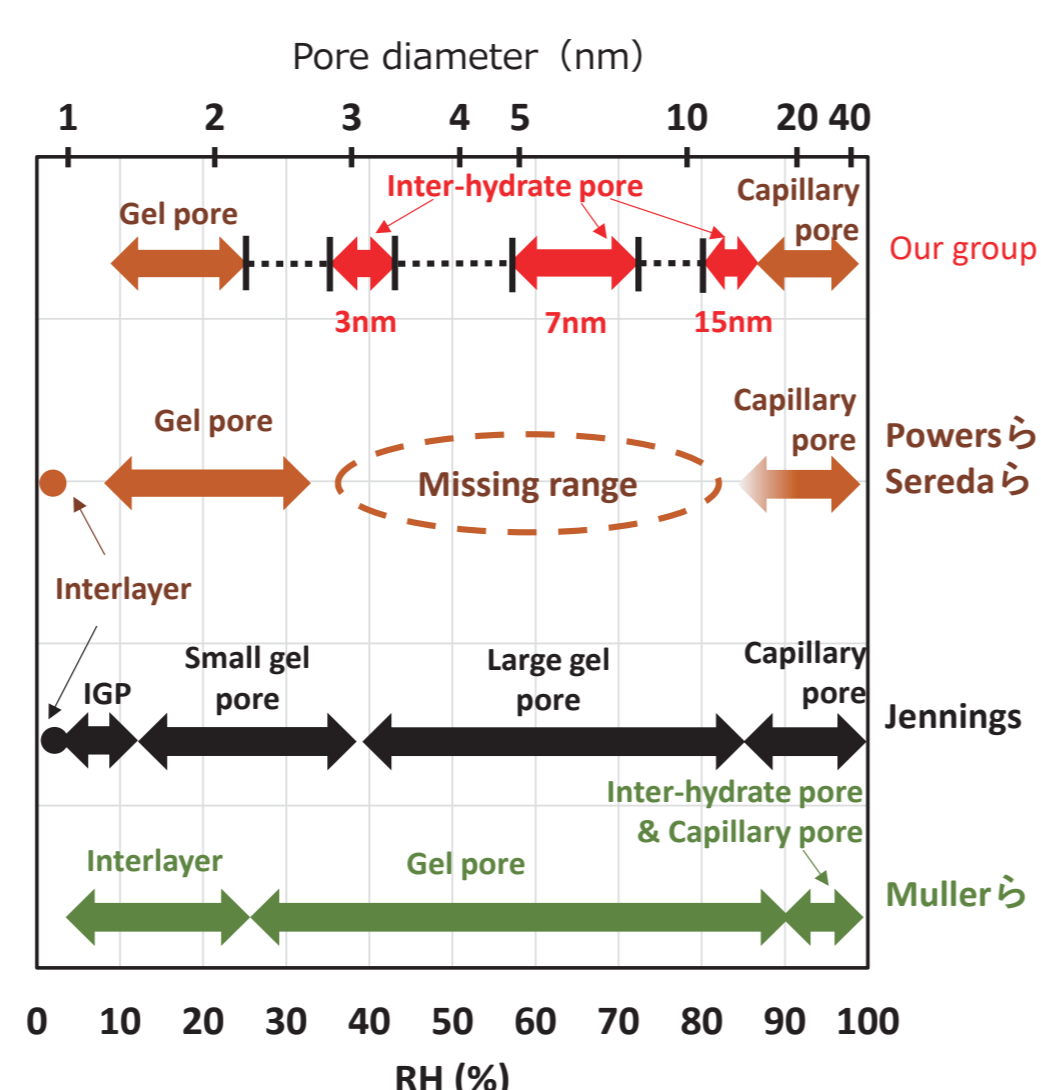
Investigation of nano-scale pore structure using isotherm

Pore structure analysis



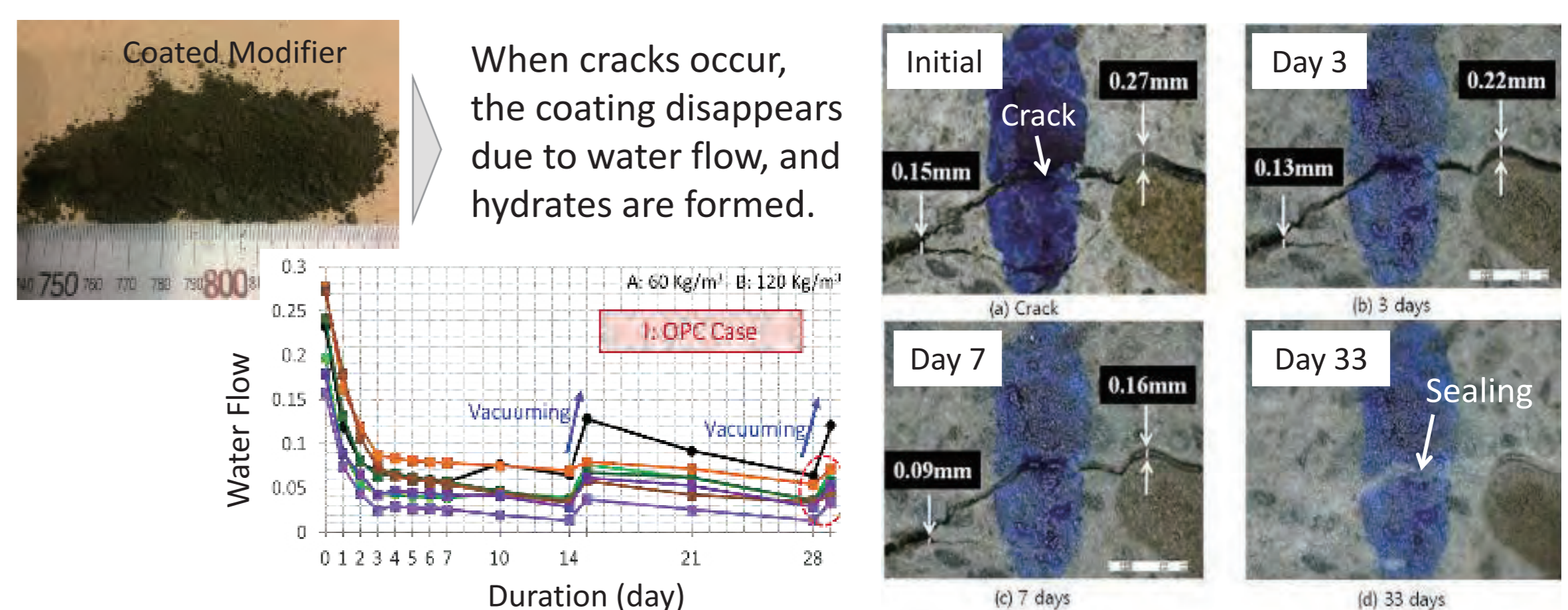
Experimental results were obtained that suggest a new classification of pore diameter, with representative pore diameter of 3 nm, 7 nm, and 15 nm.

Classification of pore diameter

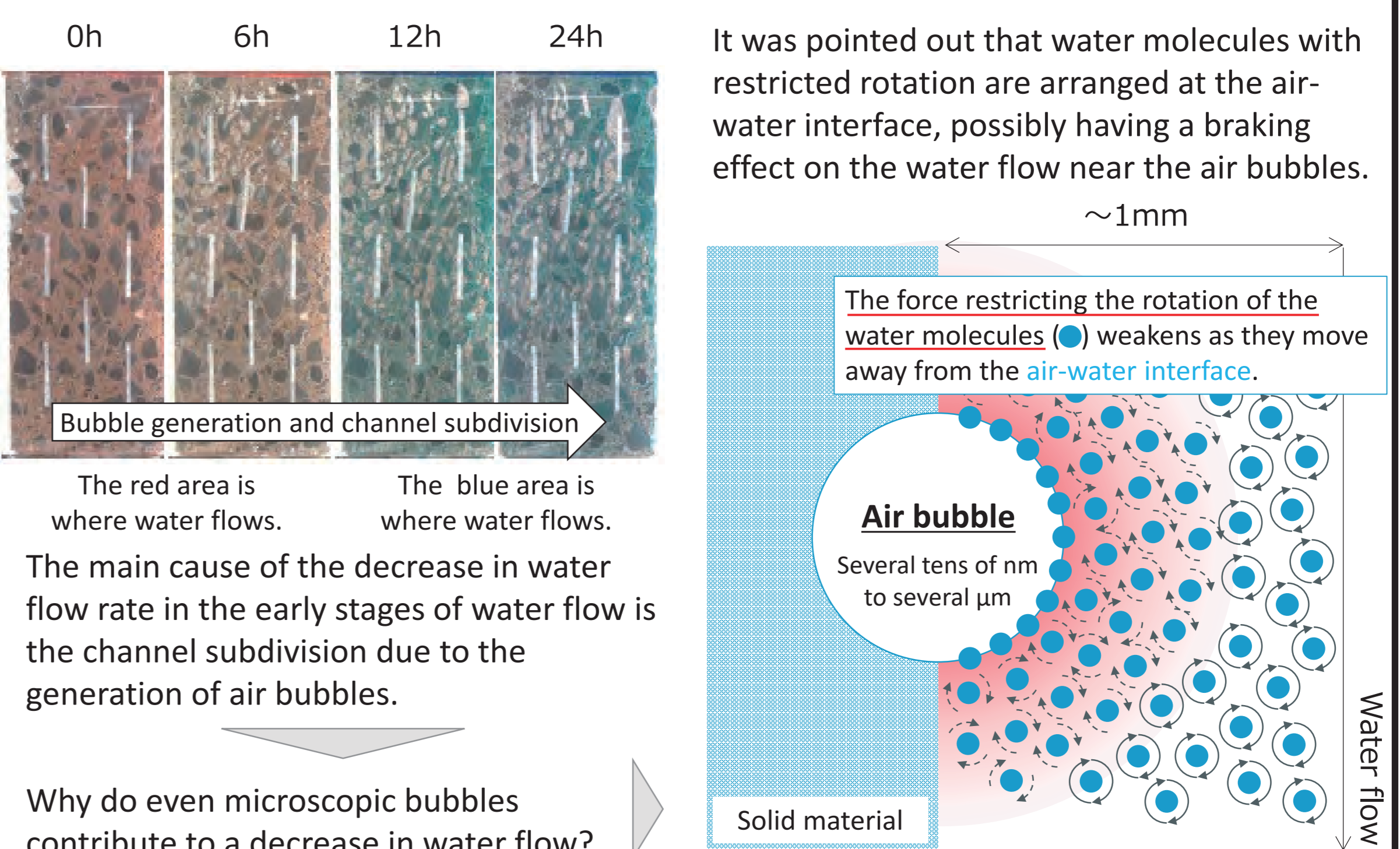


Self-healing process of self-healing concrete

- 1st generation : Crack closure due to hydration of un-hydrated cement
- 2nd generation : Crack sealing by precipitates caused by modifiers
- 3rd generation : Enhancement of sealing performance by improving modifiers



Water flow reduction due to the existence of air-water interface



Study on the regularity of flow based on velocity curve in coaxial cylinders

Observation of flow / Viscosity measurement

