

The Sumatra Earthquake and Tsunami in the Indian Ocean

The December 26, 2004 Sumatra earthquake generated tsunami in the Indian Ocean and caused more than 200,000 casualties. AIST made computer simulation of the tsunami (Figure) in the same day and the animation was posted on the website. It reproduced the observed features of the tsunami; the initial tsunami to the east (e.g., Phuket) began with receding wave while to the west (e.g., Sri Lanka) large wave suddenly reached, and the tsunami was larger in the direction perpendicular to the fault orientation. On the following day (December 27) alone, more than 60,000 accesses from all over the world were recorded.

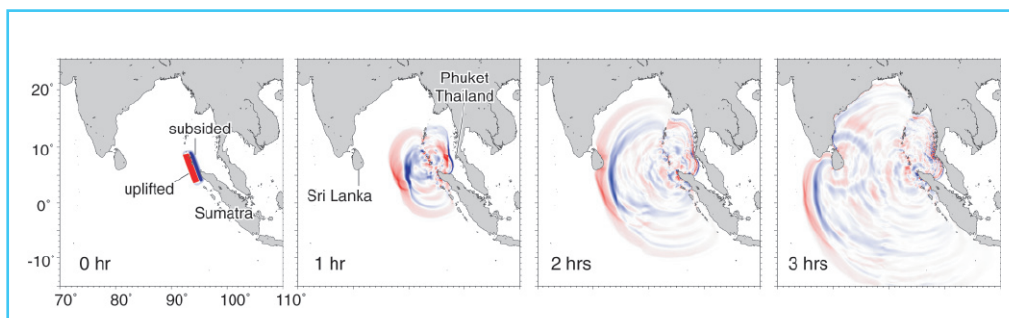


Fig. Computer simulation of the tsunami propagation in the Indian Ocean. Red color means that the water surface is higher than normal, while blue means lower. The darker the color, the larger the amplitude.

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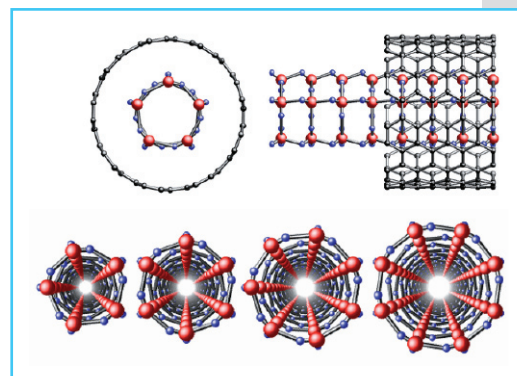
Nanotechnology, Materials & Manufacturing

World's First Room-Temperature Ice Nanotube Is Discovered

Opening the way to understanding the behavior of water molecules in nanometer-scale environments

The Nanotechnology Research Institute of the National Institute of Advanced Industrial Science and Technology and Graduate School of Science in Tokyo Metropolitan University have performed a detailed analysis of the structure of water in a single-walled carbon nanotube (SWCNT) by means of X-ray structural analysis conducted at the Photon Factory of the High Energy Accelerator Research Organization (KEK), an inter-university research institute corporation. The detailed structural analysis found that water within SWCNT forms tubular ice, called ice nanotube (Ice-NT), at lower temperatures. It was found that there was a tendency for the melting point of Ice-NT to vary greatly depending on the diameter of the SWCNT, with the melting point becoming higher as the diameter of the SWCNT becomes narrower, contrary to existing empirical rules. In particular, water in SWCNT with a diameter of 1.17 nm crystallizes at 300 K or lower. In other words, it was proved that Ice-NT could be formed at room temperature. Moreover, it was discovered that, at approximately 45 °C, water within SWCNT would vaporize and be ejected, leading to the possibility of a number of applications, including nano-size inkjet printing.

Fig. A schematic diagram of Ice-NT
Top: 5-membered ring Ice-NT formed inside SWCNT. The melting point is 300K.
Bottom: From left to right: 5-membered ring, 6-membered ring, 7-membered ring, 8-membered ring Ice-NT found in this research. Red sphere: oxygen atom; Blue sphere: hydrogen atom; Black: carbon atom.



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