A Novel Technique for Urgent Remediation of Marine Pollutants Such as Microplastics and Oil Spills Using Water Jet

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Marine pollutants such as microplastics and oil spills are major environmental hazards. The beaches of the Seto Inland Sea of Japan have become littered with plastics and polystyrene foam. In order to address this problem, we exploited a phenomenon in which a water jet projected from under the water surface transports surrounding water into the air, thus enabling us to develop a technique for removing contaminants. We constructed a device and conducted preliminary studies to collect floating contaminants from marine environments near Hiroshima. This study verified that the volume of contaminants collected changes depending on the diameter of the water jet, the velocity of the water jet, and the depth from which the water jet is projected. We conducted three real-world experiments using the device in the marine environments. We succeeded in collecting microplastics and floating materials at a rate of up to 3.2 g/min. This newly developed technique is highly versatile and can also be used to remove oil and minute particles from the water. Furthermore, the new device has high durability because it is mechanically simple. Thus, the device can remove contaminants continuously. In the future, we intend to further improve the capabilities of this device by changing the shape of the nozzle and the flow of the projected water to increase the amount of contaminants collected. In addition, we would like to modify the device to enable the collection of oil. We hope that these improvements will help to solve water pollution problems throughout the world.