

# Nobody knows the environmental fate of plastic garbage

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After the rain fall occurred, we often observed the plastic garbage such as plastic bags and PET bottles in the waterside. However, nobody knows the environmental fates of plastic garbage in the water environment. Plastics such as the container packaging are gradually decomposed in the environment, and they become microplastics.

A report concerning the transportation of toxic chemicals with plastic pellets in the ocean was reported in 2001 (Mato, Y. *et al.*, *Envi. Sci. & Tech.*). Accumulation of brominated flame retardants in seabirds due to drink plastic garbage by mistake was reported in 2013 (Tanaka *et al.*, *Mar. Poll. Bull.*).

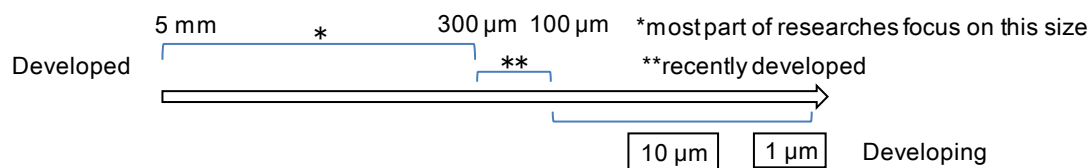
Total 2,271 published papers include “Microplastics” in the key words from 2009 to 2018 in the world, of which 1,437 papers have “Marine” as the second key word. Measures in the global environment, for example, the enactment of the ocean plastics charter in 2018 and so on has been starting. The number of papers intended for inland waters and urban area were only 190.

It is necessary to specify the sources in order to solve the aquatic environment pollution with microplastics. Most researchers who were focusing on the microplastics in marine tended to analyze the microplastics which size was bigger than 300 μm. Recently, some researchers start to focus on smaller size of microplastics. As the results, in the personal care product such as scrub cosmetics, more than 621,000 microplastics were observed in the one product, which sizes were about 200 μm. There are many microfibers of the fiber origin such as fleeces, which sizes were about 30 μm.

It has been understood like this that the aquatic environment pollution with microplastics is serious as the size of them becomes small. To know where the microplastics are generated, and what size, and where they exist is one of the emergent issues in the world.

References Mato, Y., T. Isobe, H. Takada, H. Kanehiro, C. Ohtake, and T. Kaminuma, Plastic Resin Pellets as a Transport Medium of Toxic Chemicals in the Marine Environment, *Env.Sci. and Tech.*, 35(2), 318-324, 2001.  
 Kosuke Tanaka, Hideshige Takada, Rei Yamashita, Kaoruko Mizukawa, Masaaki Fukuwaka, Yutaka Watanuki, Accumulation of plastic-derived chemicals in tissues of seabirds ingesting marine plastics, *Marine Pollution Bulletin*, 69, 219-222. 2013.

## 1. Development of analytical procedures



## 2. Surveys on urban watersheds

Thermoset Polymer	Biodegradable Plastic
Thermoplastic Resin	
Polycarbonate	Polyethylene
Fluoroplastic	Polypropylene
$\left( \begin{array}{c} F & F \\   &   \\ C-C \\   &   \\ F & F \end{array} \right)_n$	Polyvinyl chloride
$\left( \begin{array}{c} F & F \\   &   \\ C-C \\   &   \\ F & O \\ &   \\ & F \end{array} \right)_m$	Polystyrene
$F-C-F$	PET
	Acrylate resin

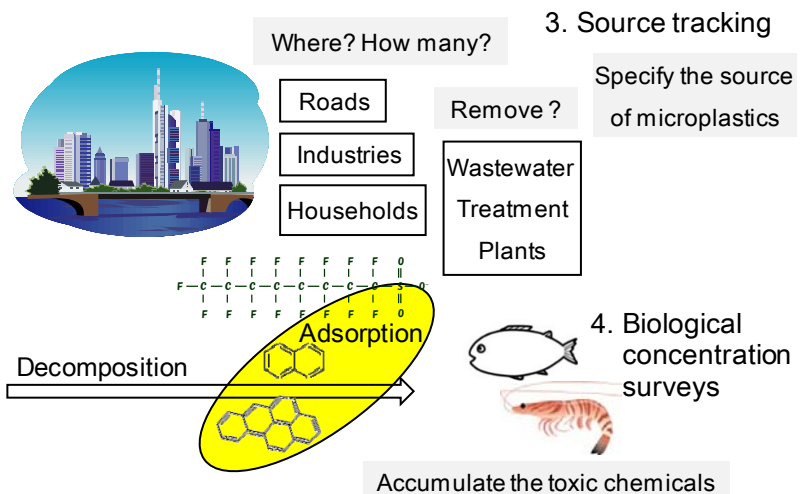


Fig Abstract of research issues on microplastics in water environment