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Safe management strategies of nanowastes in South Korea

Ji Hye Jo
Korea Environment Institute, South Korea

With the rapid development of nanotechnology, the use of nanomaterials has increased sharply in various industrial, medical and environmental sectors. A considerable amount of nanomaterials have been discharged in the form of nanowastes in manufacturing plants or laboratories, or after being used by consumers. Concerns over the safety risks of these nanomaterials or nanoproducts to human health have also been continuously raised. In South Korea, the world's third largest producer of nano-goods, there are little data about how nanowastes are exposed to the environment and discharged. In case nanowastes are recycled, nanoparticles containing dust are discharged in the crushing process and released, having negative effects on workers' health and the environment. Sludges and ashes generated during wastewater treatment and incineration, respectively, end up in landfills and are discharged back into the environment as secondary nanowastes. In this study, we examined the behavior of nanomaterials based on the material flow analysis applied from the major sources of nanowastes to the final landfill through waste treatment facilities. We analyzed the management system and issues by estimating the flows of well-known nanomaterials (n-TiO_2, n-ZnO, n-Ag, CNT) with focus on waste incineration process (scenario I~III). According to scenario III which reflects the domestic waste treatment rates, about 48 tons of n-TiO_2 and 178 tons of n-ZnO would be discarded to the landfill per year after incineration. In case of n-Ag, a relatively small amount would be produced, among which 7 tons could be processed in incinerators. While around 1 ton of carbon nanotubes would be incinerated, around 99% are estimated to be removed after combustion. In conclusion, other nanomaterials except CNT would not be removed in the incineration process and end up in landfill sites, leading to prediction that a small amount of nanomaterials or less than 0.04% would be emitted into the atmosphere.

Biography

Ji Hye Jo is a Research Fellow at Korea Environment Institute, the Korea's leading think tank on environmental policy and environmental impact assessment (EIA) sponsored by Korean Government. Her major was a Biological Hydrogen Energy Production. Recently, her research interest includes sustainable resource circulation and waste management policy. She focuses on efficient waste-to-energy, recycling of rare metals and safe management of hazardous wastes such as medical wastes.

jhjo@kei.re.kr

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