

Safety data for ZEONANO[®] SG101

Safety evaluation test (for human health)

Evaluation item	Test method	Test result
Skin corrosion/irritation	OECD TG404	No irritation
eye damage/irritation	OECD TG405	No irritation
skin sensitization	OECD TG406	not observed
Genetic toxicity	Reverse mutation(Ames Test) OECD TG471	Negative
	Chromosome aberration OECD TG473	Negative
	Micronucleus test OECD TG474	Negative
intra-tracheal instillation	Rat single dose, repeated dose	Transient inflammation
Intraperitoneal administration	Rat 1month	No inflammation
Cytotoxicity of mesothelium cell	in vitro	Negative
Inhalation toxicity	Rat 13weeks	The carcinogenicity and the toxicologic influence were not accepted.

Safety evaluation test (for environment)

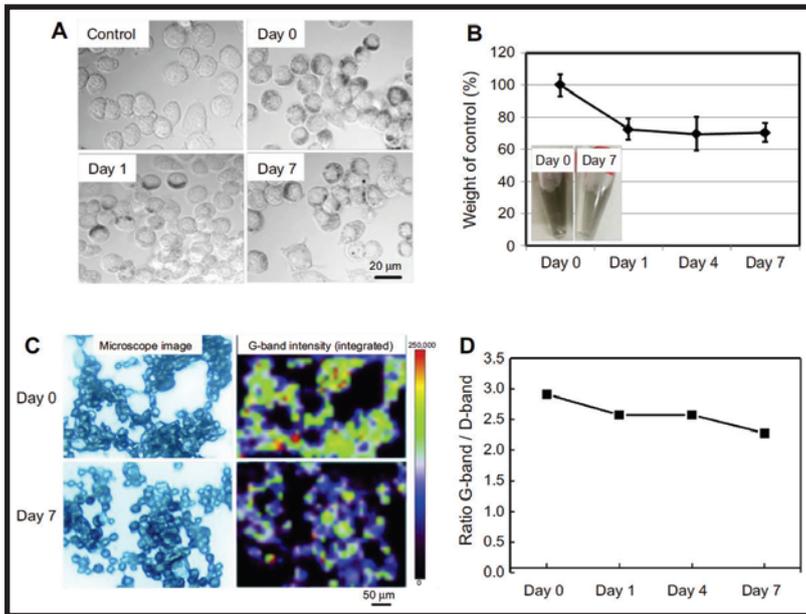
Evaluation item	Test method	Test result
Aquatic hazard (acute)	(Algae)OECD TG201	EC ₅₀ >10mg/L
	(Daphnia magna)OECD TG202	EC ₅₀ >10mg/L
	(Fish:Oryziaslatipes) OECD TG203	LC ₅₀ >10mg/L
Aquatic hazard (chronic)	(Algae)OECD TG201	GHS Category2 Growth inhibition (NOEC: 0.32mg/L)
	(Daphnia magna)OECD TG211	GHS Category2 Reproductive inhabitation (NOEC:0.32mg/L)
	(Fish:Oryziaslatipes) OECD TG204	LC ₅₀ >10mg/L
Biodegradability by activated sludge	OECD TG301C, 301F, 302C	Degradability : 0
Activated Sludge, Respiration Inhibition	OECD TG209	No toxicity
Bioaccumulation	(Carp)OECDTG305	There is no change in body length and body weight. (Under consideration about the accumulation factor)
Soil Microorganisms	OECD TG216	No influence

*From the press release of Zeon Corporation on February 4, 2019

We are conducting joint research with Professor Hori of Nagoya University on environmental biodegradability.

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Biodegradability of Super-Growth SWCNT(SGCNT)



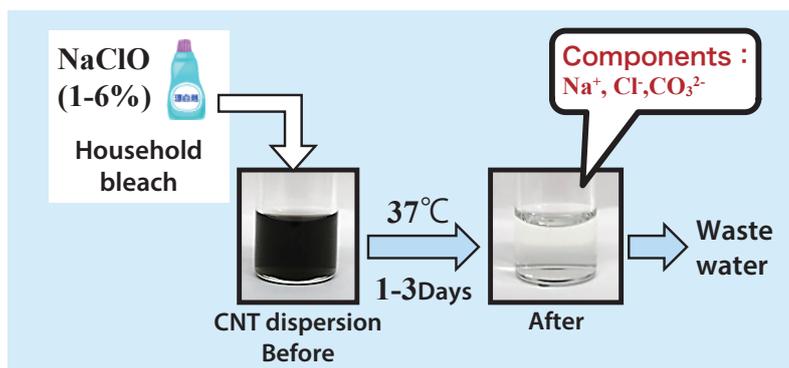
SGCNT degradation in Raw264.7

(Ref) International Journal Nanomedicine, 2019, 14, 2797-2807

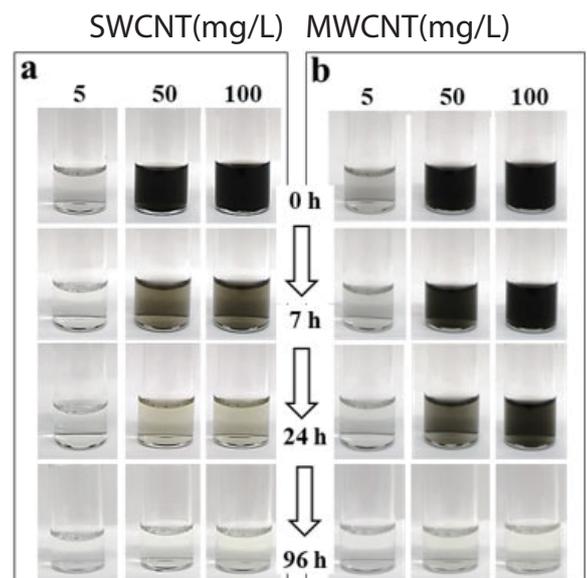
- SGCNT is biodegradable in macrophages Raw264.7 (Mouse macrophage)
- SGCNT degradation in macrophages was observed by fading color, far-red absorption, Raman spectrum.
- SGCNT is degradable in Kupffer cell (rat liver) too.
- ROS* decreased after CNT-degradation (Cytotoxicity decreased)
- *ROS: Reactive oxygen species

Degradation of CNTs by Sodium hypochlorite(NaClO)

2019/02/04 AIST Press release



- CNTs are completely degraded by NaClO
- Both SWCNT and MWCNT are degraded
- ⇒ Expect as a treatment of waste water including CNTs



Degradation of CNT dispersion after adding NaClOaq

AIST : National Institute of Advanced Industrial Science and Technology