Evaluations of food contact coatings in Slovenia

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NIJZ National Institute of Public Health

Evaluations of coatings

- No evaluation of substances prior to authorisation, no national legislation
- Assessment of the risks of non-compliances and testing of official control samples: National Laboratory of Health, Environment and Food
- Research: National Institute of Public Health in cooperation with Jožef Stefan Institute

NACIONALNI LABORATORIJ ZA ZDRAVJE, OKOLJE IN HRANO

NIJZ National Institute of Public Health

Institut "Jožef Stefan" Ljubljana, Slovenija




Food contact coatings: cookware, containers, cans, coated wooden articles

Official control of substances released from the coatings:

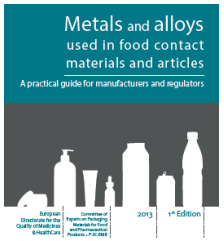
- BPA, BADGE and derivatives, BFDGE and derivatives from epoxy coatings,
- PAAs and formaldehyde form PTFE coatings,
- terephtalic and isophtalic acid from polyester coatings
- GCMS identification of migrated substances

Quasi-ceramic coatings :

- Release of Pb, Cd, Al, Cr, Fe, Ni, Zn

Articles evaluated as safe if:

- conc. of metals released is < SRL (CoE Technical Guide for Metals and Alloys)
- PAAs, HCHO, tere/isophthalic acid, BPA, other organic substances released < SML (Regulation 10/2011)
- BADGE, BFDGE and derivatives released < SML (Regulation 1895/2005)



If concentrations exceed SML, SRL or substances listed as CMR:

- exposure assessment: use of EFSA Comprehensive European Food Consumption Database data
- risk characterisation

Migration testing methodology

Regulation 10/2011

According to intended use:

- selection of simulants, t and T

- in specific cases recalculation of migration test results by applying S/V ratio 6 dm^2/kg food

Where possible, use of foodstuffs instead of simulants

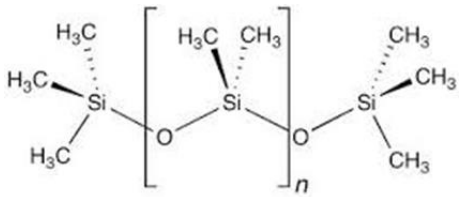
Coatings containing NPs

- Use: non-stick /self cleaning properties, better mechanical properties (increased hardness, scratch resistance), antimicrobial properties, gas barrier properties
- Substances: nano TiO_2, nano SiO_2, nano Ag, nano ZnO
- Articles: machinery, conveyor belts, cookware
- Frequency of use: worst case every day,

  cookware: average use: 2-3 X week

Our research: quasi-ceramic pan coatings

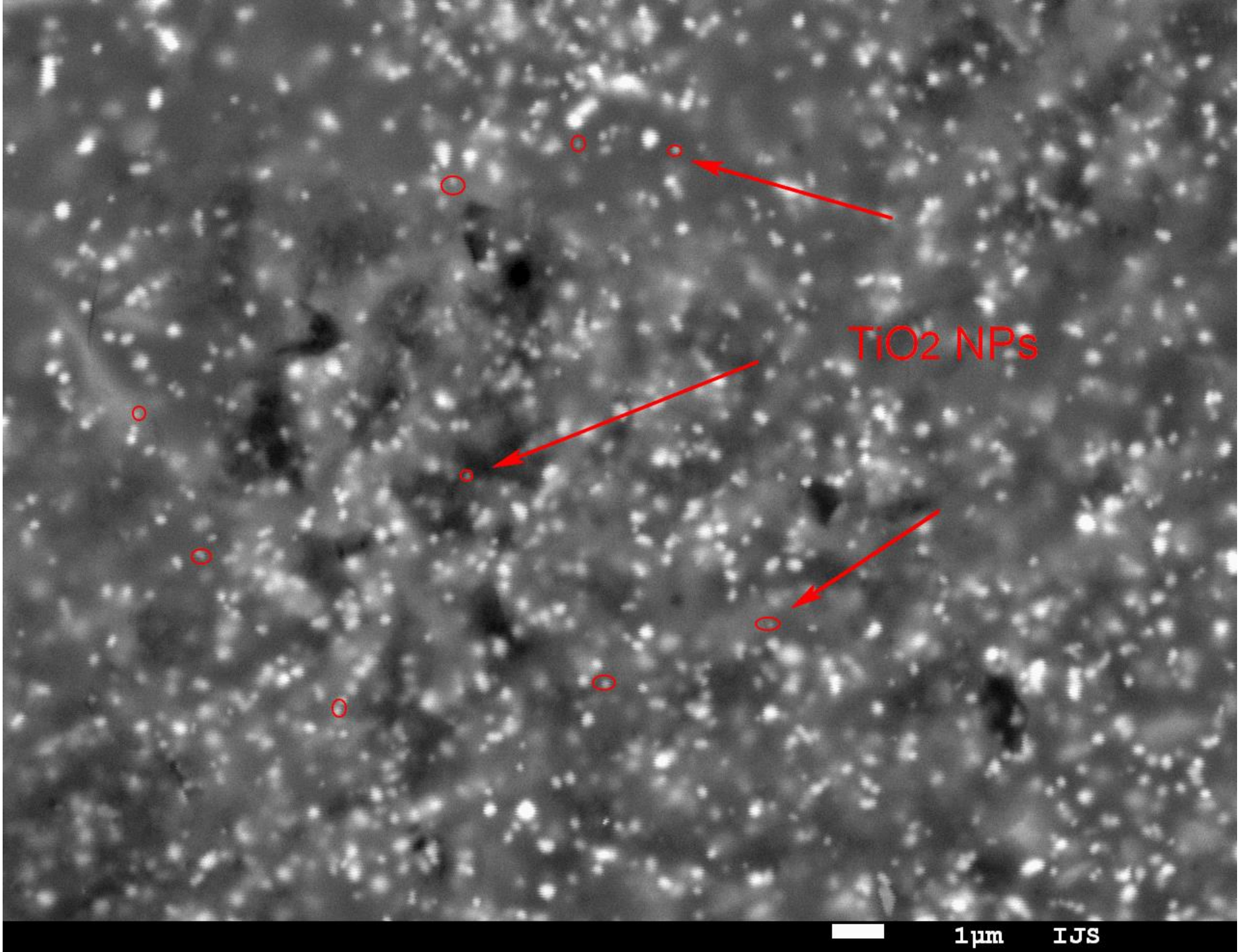
Coatings on aluminium substrate, micron- and nano-sized containing rutile TiO_2 particles and quartz SiO_2 embedded in a silicone polymer matrix.



Migration tests into simulants

3% acetic acid, deionised water

and 5g/l citric acid (three succesive tests, 2 h at 100 ^oC). Particles were separated from ions by ultrafiltration, Ti conc. was determined by ICP MS and recalculated to TiO_2


TiO2 NPs
1µm
IJS

Main outcomes:

- Release of TiO_2 particles and Ti ions into food simulants (dissolution from the surface)
- Difference between release into 3 % acetic acid and 5g/l citric acid, the former showing the highest particle migration (861 µg Ti/kg simulant or 1437 µg TiO_2/kg simulant)
- Release due to mechanical abrasion of matrix (chipping nature of the coating)

- Size distribution of nano TiO_2 used for coating production is not known (commercial sample)
- Size distribution in the coating (assessed from SEM image): 70 to 200 nm
- Size distribution of the migrants in 3% acetic acid by DLS: broad (polydispersity index 0,480), D_{eff} (effective hydrodynamic diameter): 536 nm (agglomeration)