



Otwarte seminaria 2016

Instytut Ekologii Terenów Upzemieszczonych w Katowicach

Nanocząsteczki węgla – potencjalne źródło zanieczyszczenia żywności i środowiska

mgr Julia Karpeta-Kaczmarek

mgr Marta Dziewięcka

Katowice, 16 czerwiec 2016



▪ Marta Dziewięcka



▪ dr hab. Maria Augustyniak



▪ Julia Karpeta-Kaczmarek

NANOTOXICOLOGY TEAM

N A N O

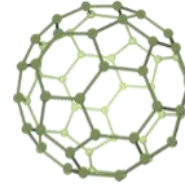
TECHNOLOGY

small structures (1 - 100 nm)

IMPLANTS

POLISHING

DRUG CARRIERS



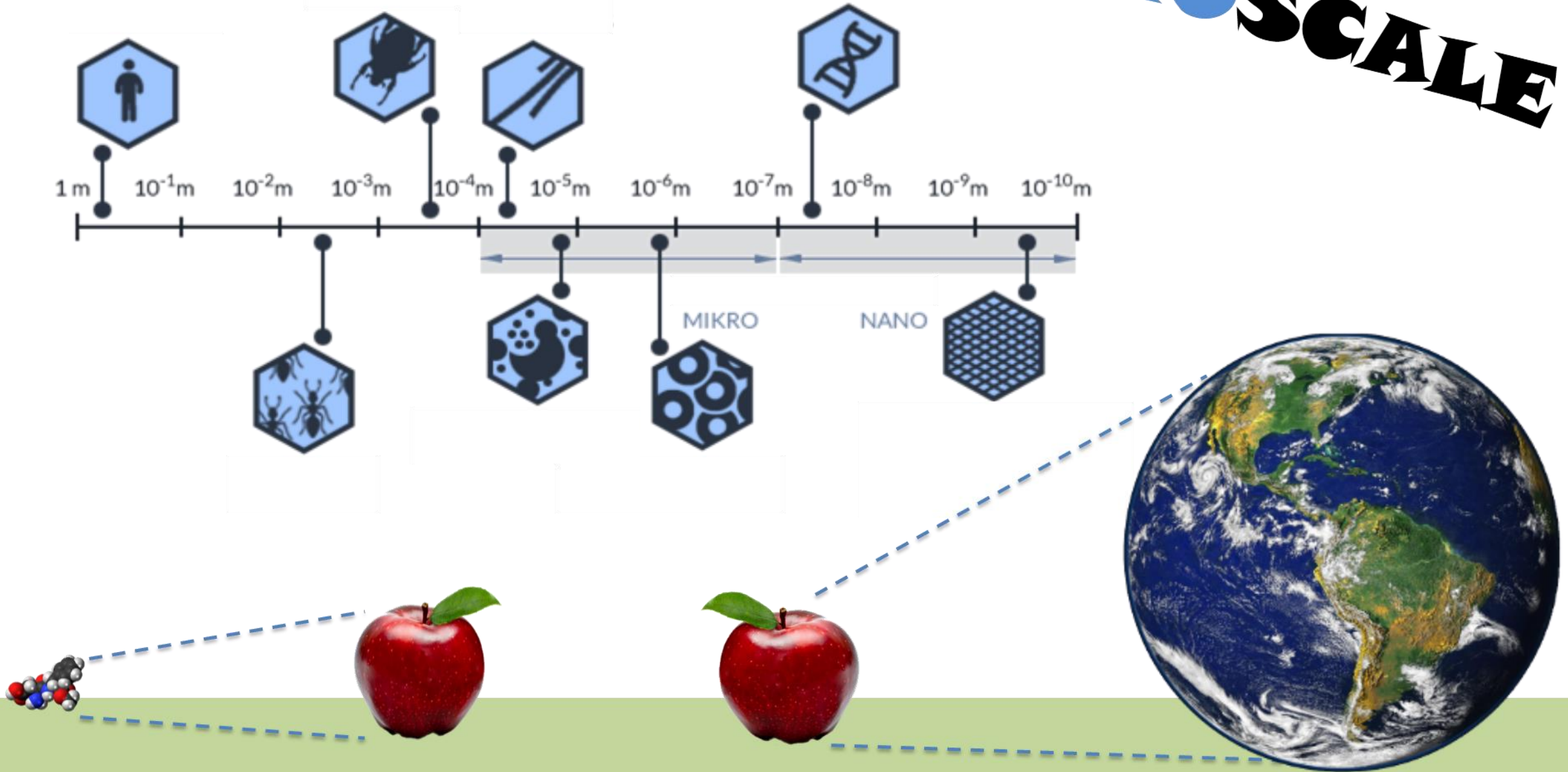
POLYMER
COMPOSITIONS

BIOSENSORS

ELECTROCHEMI
CAL COATINGS



NANOSCALE

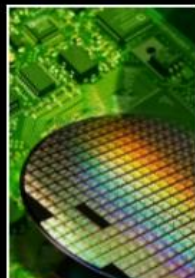
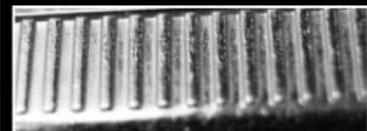


APPLICATIONS of

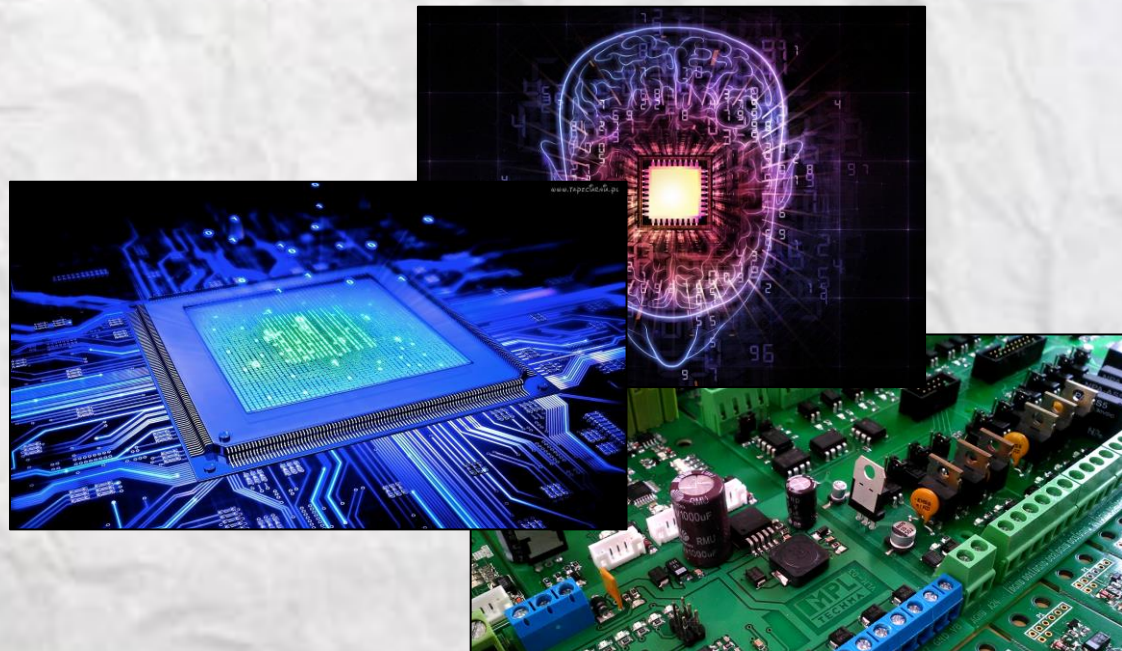
NANO



every field of daily life

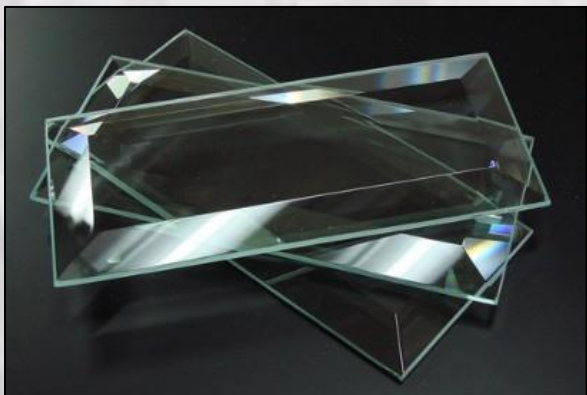


ELECTRONICS



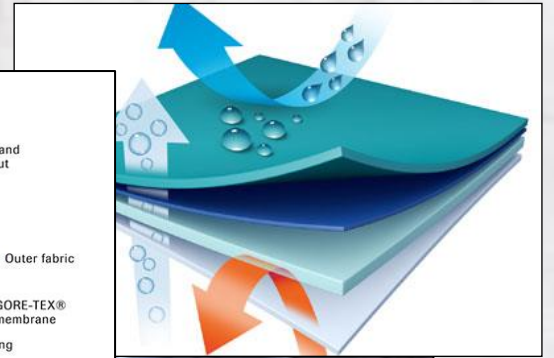
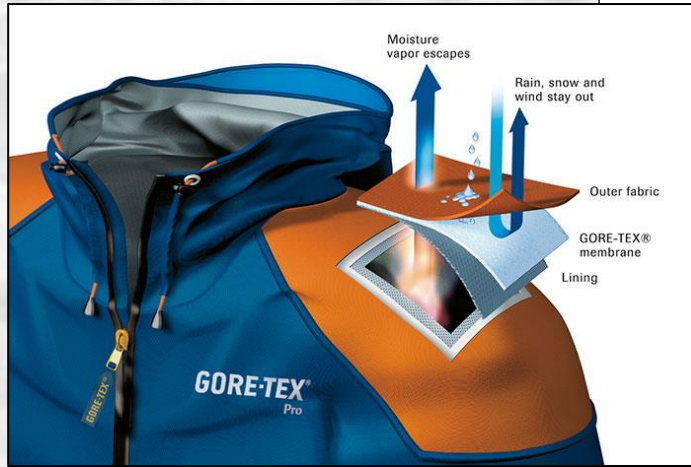
RESISTANT COATING

PAINTS



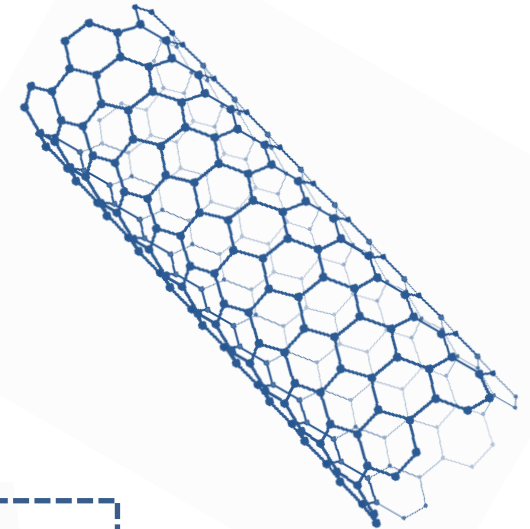
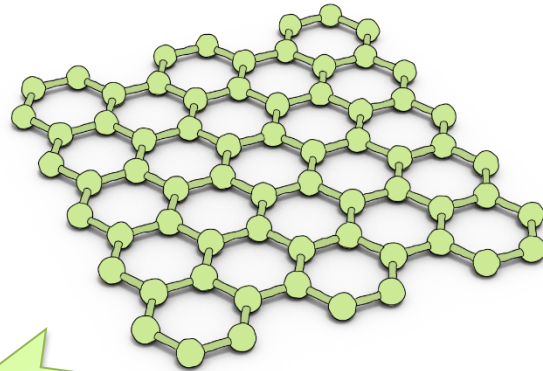
SCREENS AND FILMS

MEMBRANES

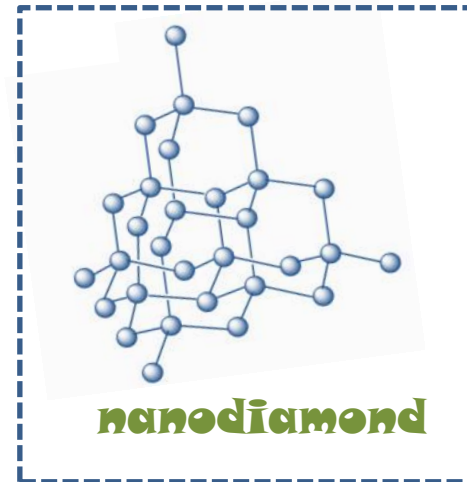


CATALYST

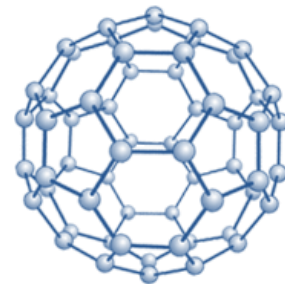
Graphene family materials



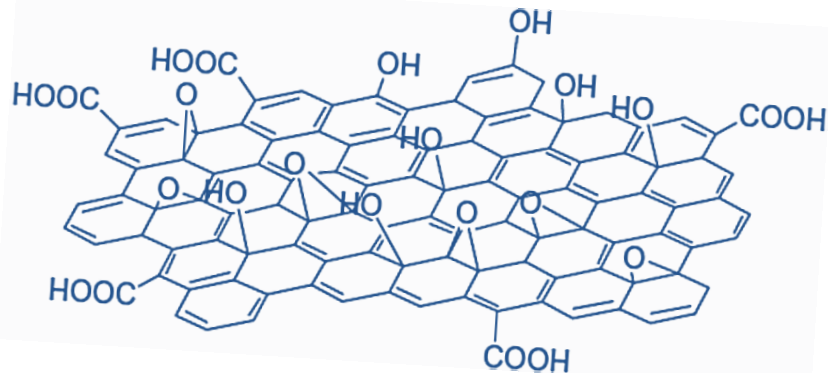
nanotubes



nanodiamond



fullerenes



graphene oxide

Advances in nanotechnology carry a risk of high nanoparticles



nanotoxicological research programs become more important nowadays

Nanodiamonds

 **extreme chemical inertness**

 **optical transparency**

 **exceptional hardness**

 **electrochemical inertness**

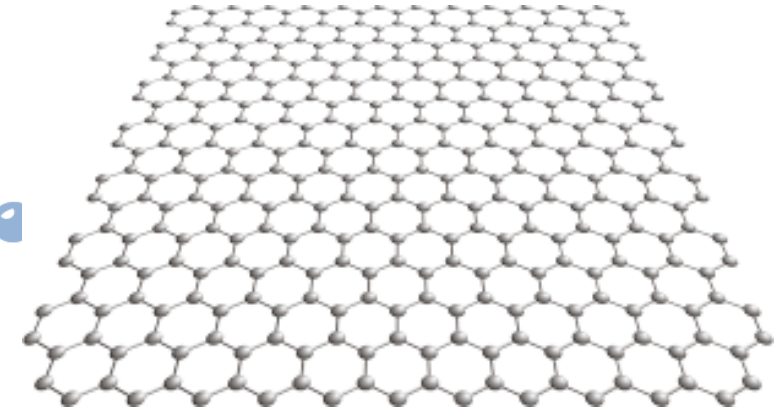
 **surfaces provide a convenient platform
for bioconjugation**



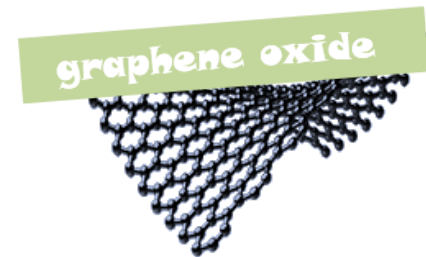
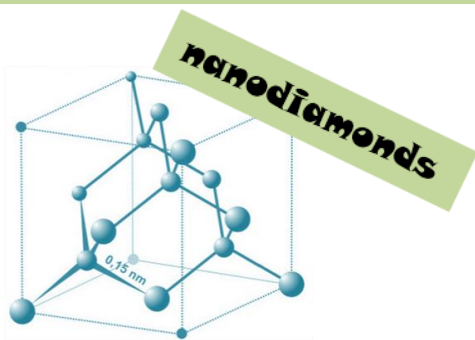
Graphene oxide

- 💎 **very thin - nearly transparent sheet**
- 💎 **very strong - 100 times stronger than steel**
- 💎 **very good conductor - because have free electrons in its structure**

💎 **surface can be chemically modified to achieve particular purpose**



Nanoparticles administered in food



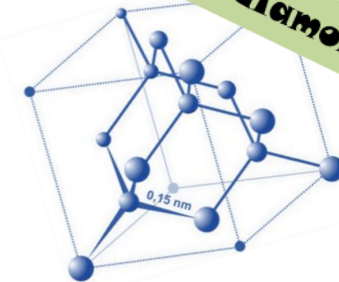
ND20: 20ug/g of food
ND200: 200ug/g of food
Control: 0ug/g of food



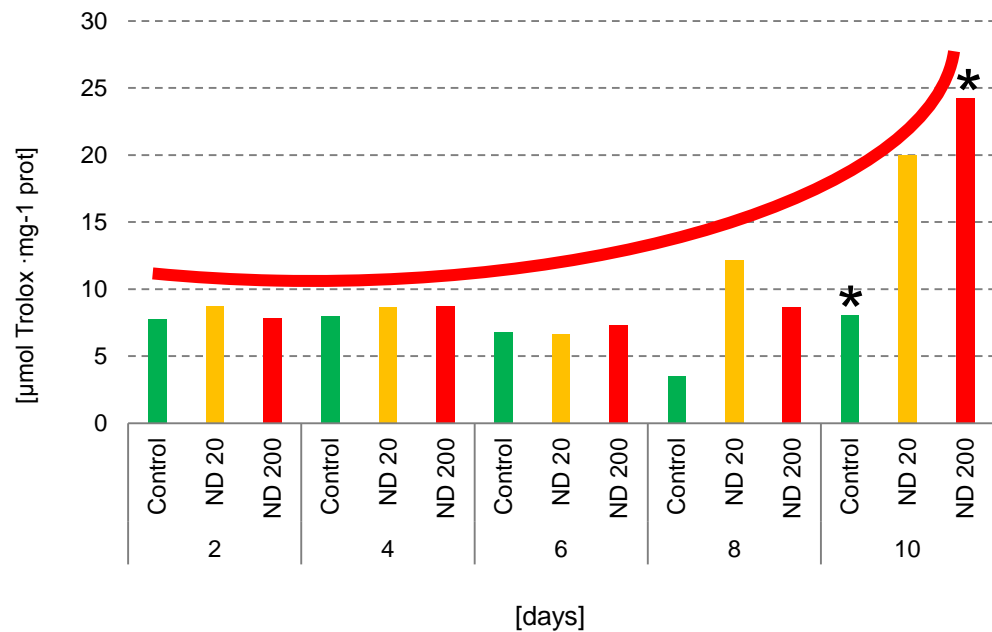
Mn: 200ug/g of food
GO: 200ug/g of food
Control: 0ug/g of food

RESULTS

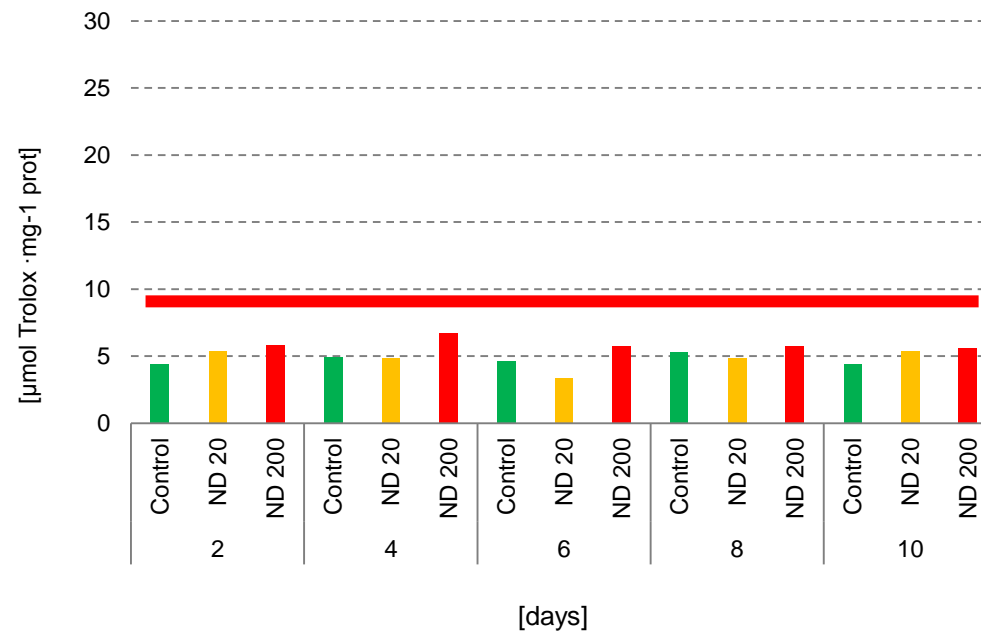
nanodiamonds



TAC = total antioxidant capacity



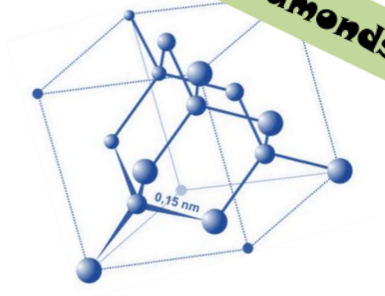
gut



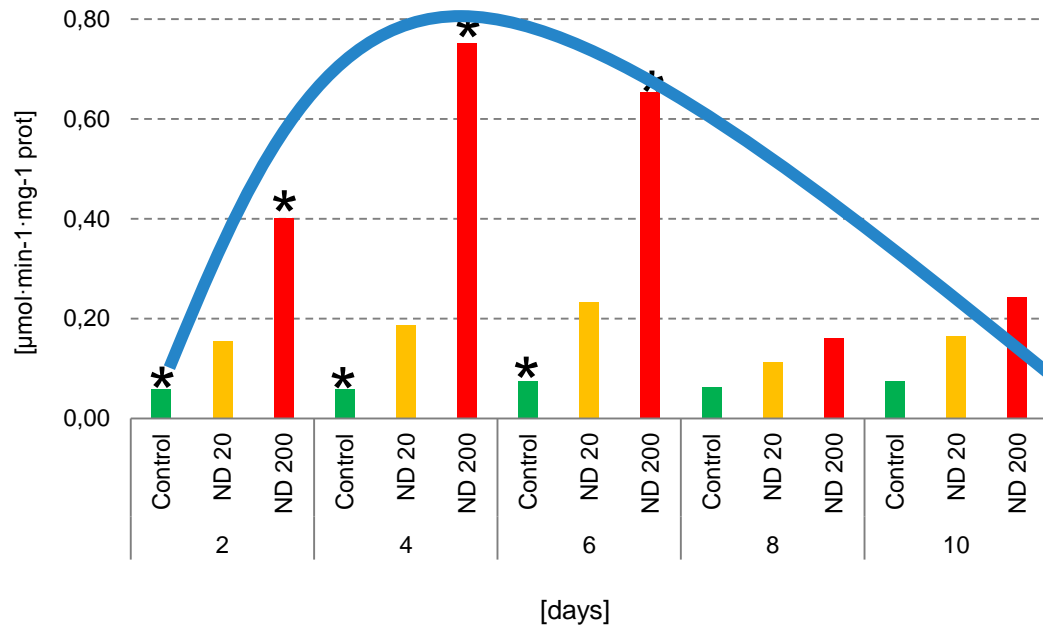
hemolymph

RESULTS

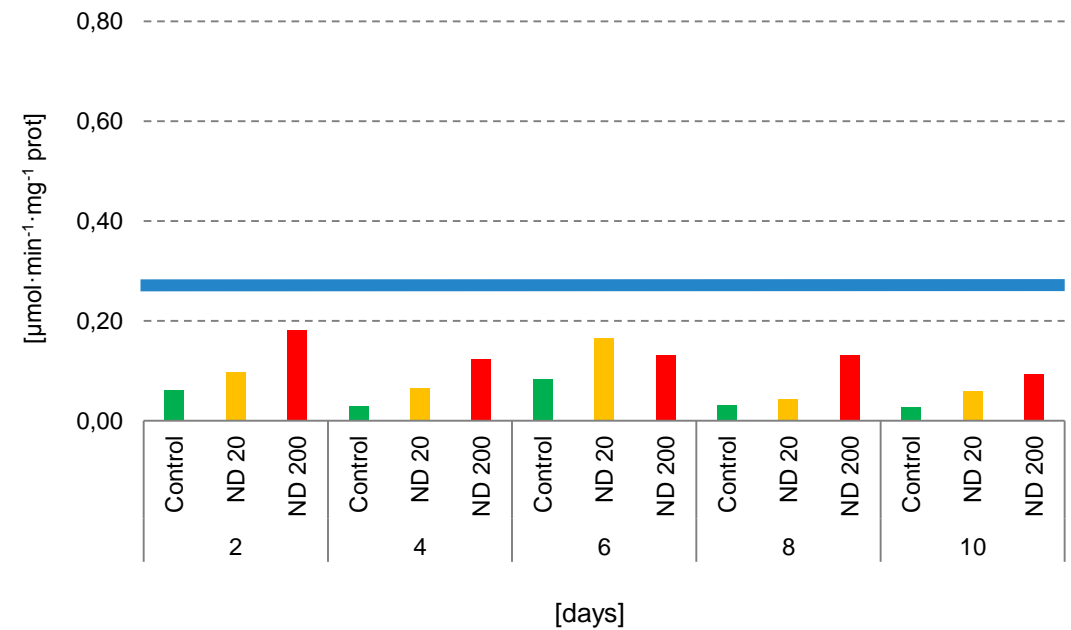
nanodiamonds



CAT - catalase assay



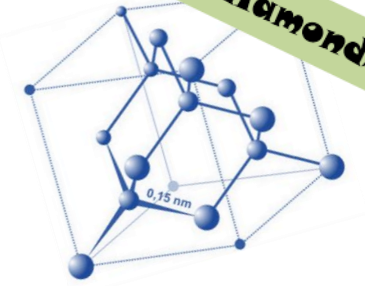
gut



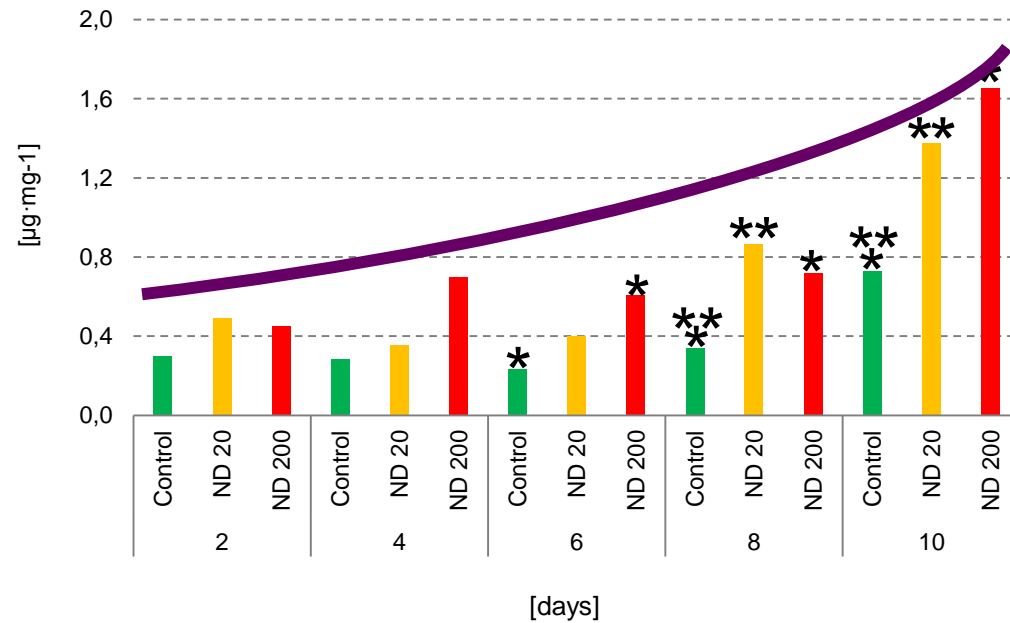
hemolymph

RESULTS

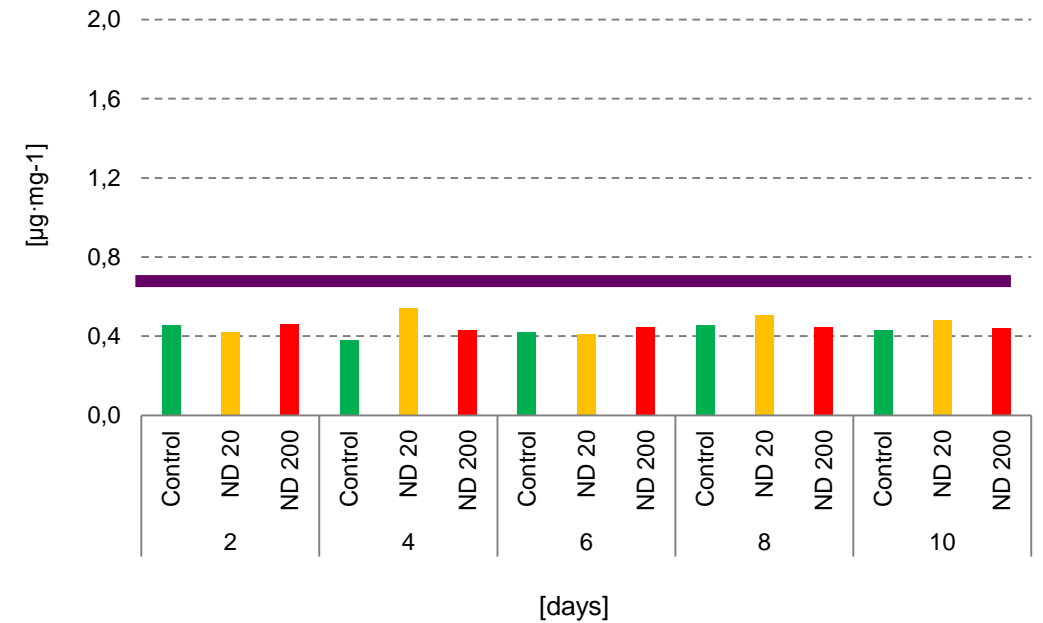
nanodiamonds



HSP 70 - heat shock proteins



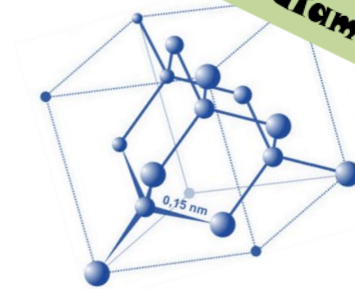
gut



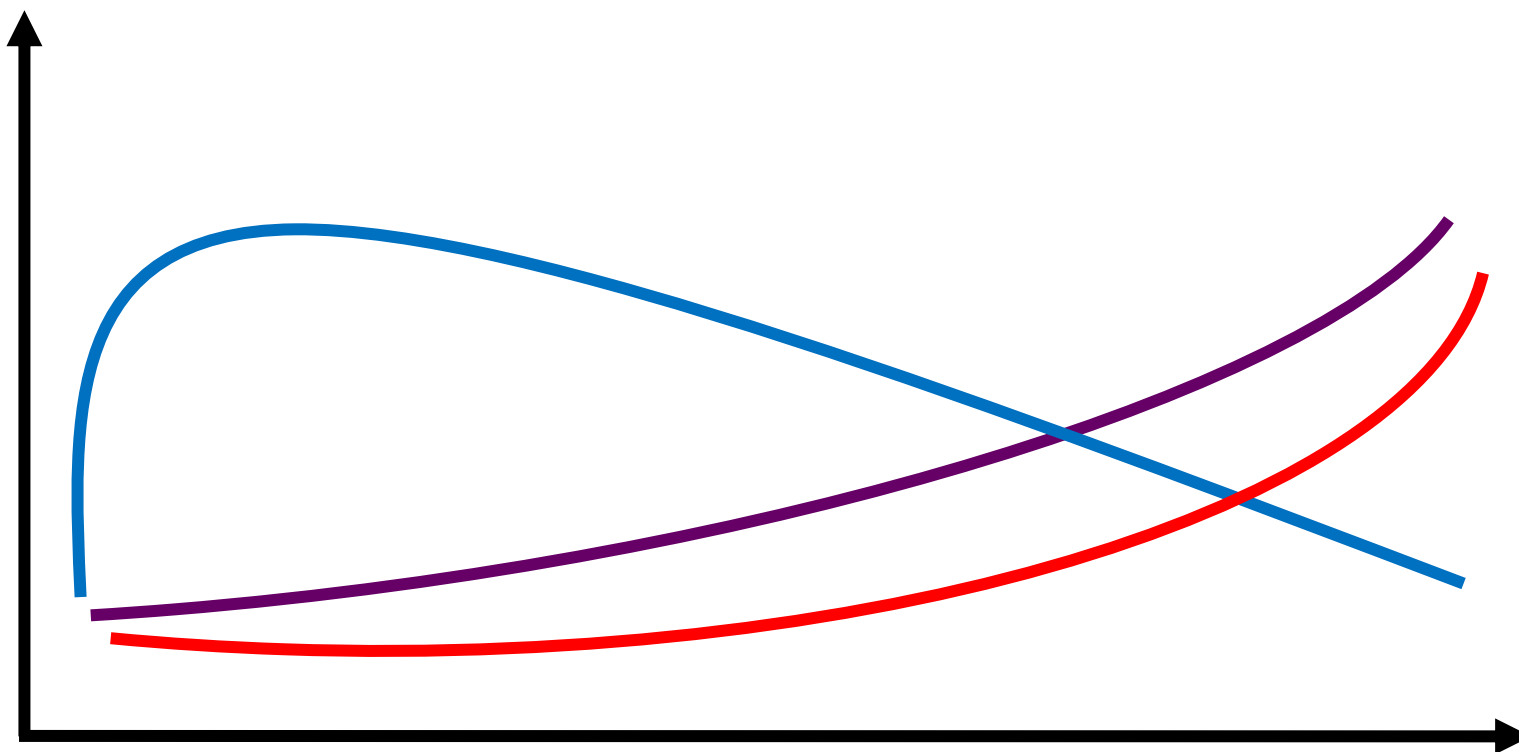
hemolymph

RESULTS

nanodiamonds



Stress Parameters



WAC

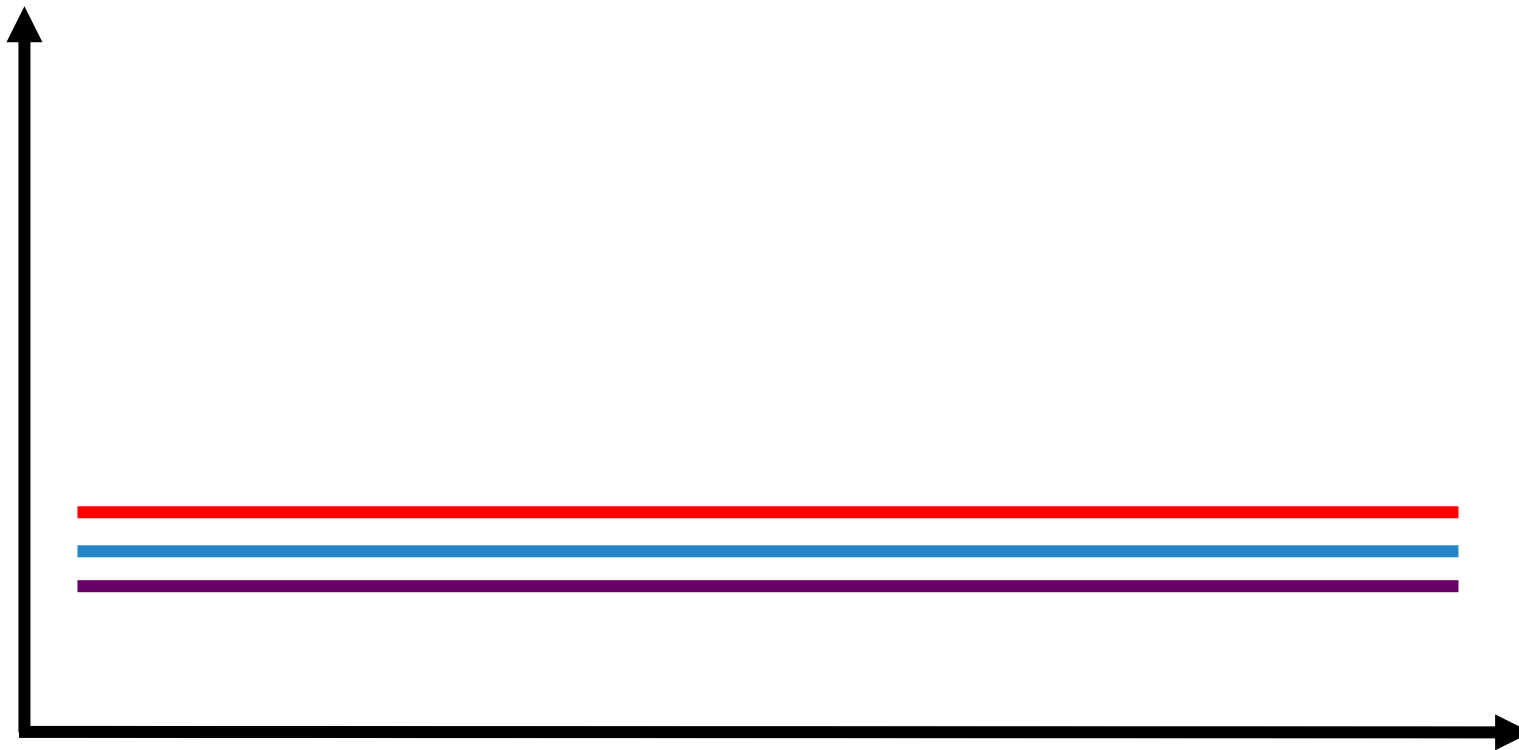
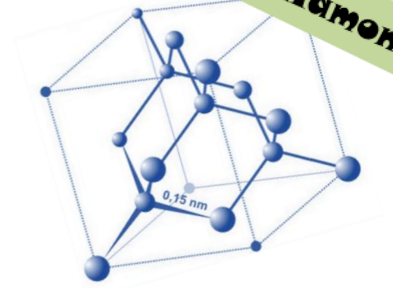
CAT

HSP 70

gut

RESULTS

Stress Parameters



TAC

CAT

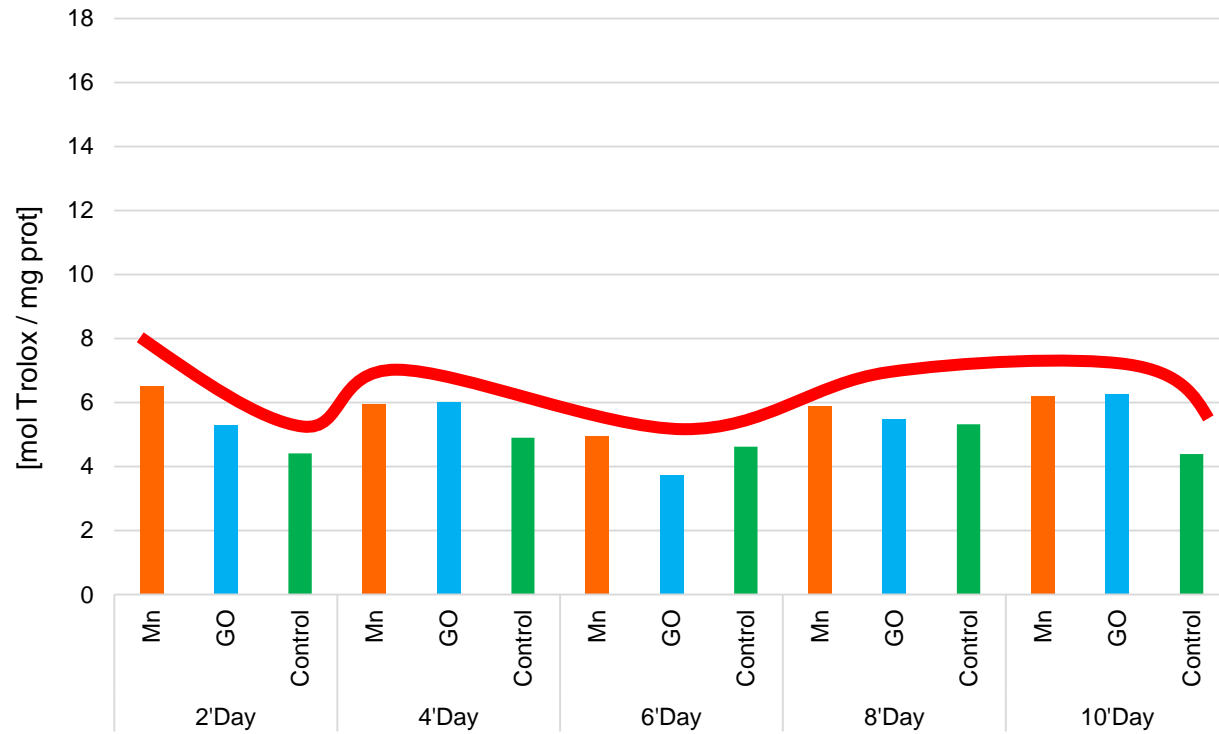
HSP 70

hemolymph

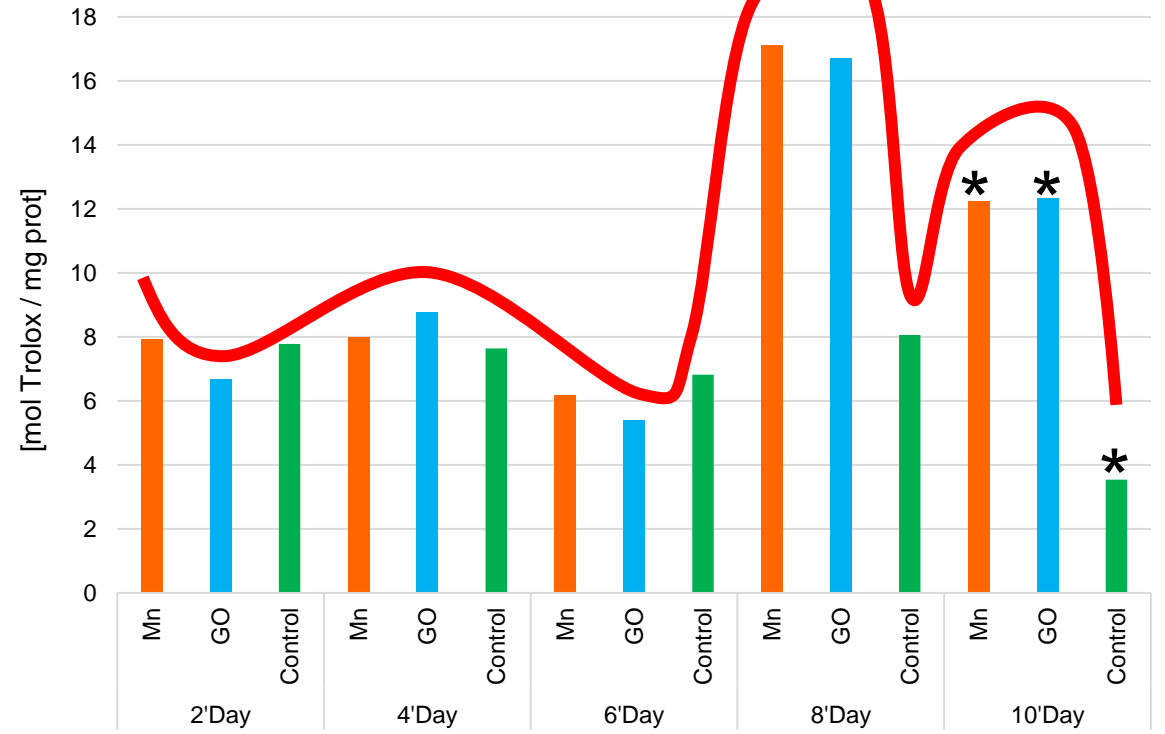
RESULTS



TAC = total antioxidant capacity



hemolymph

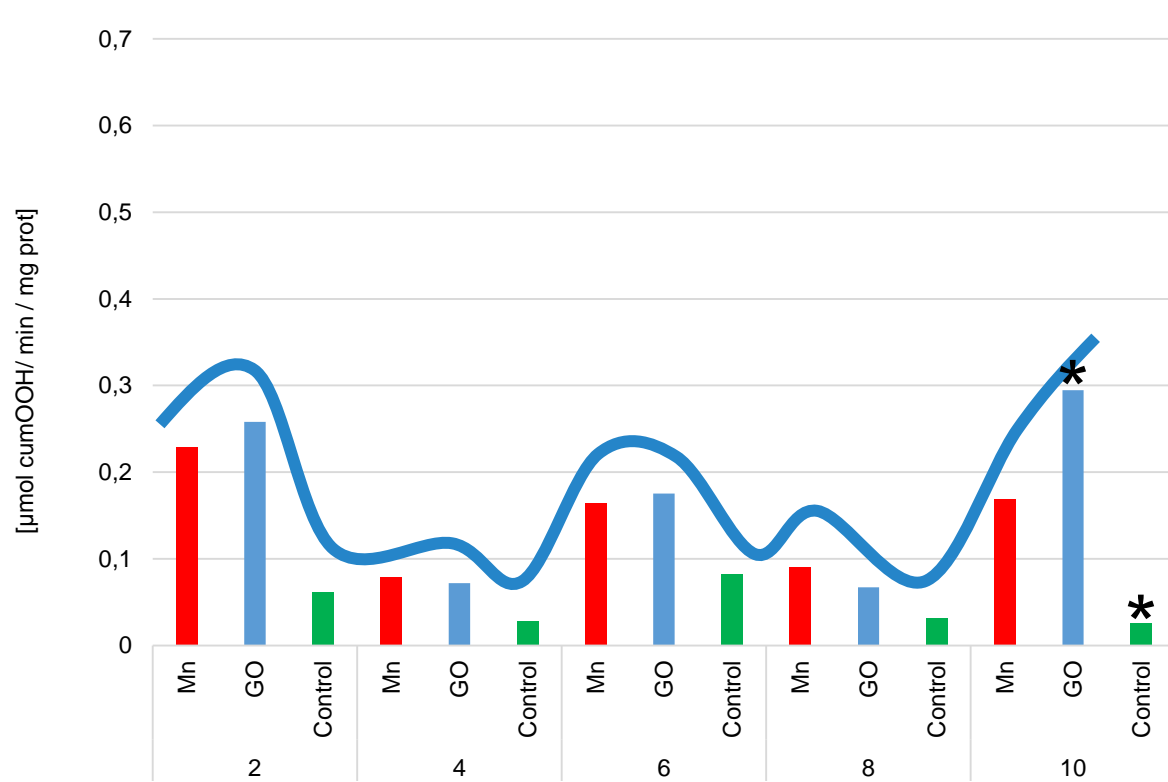


gut

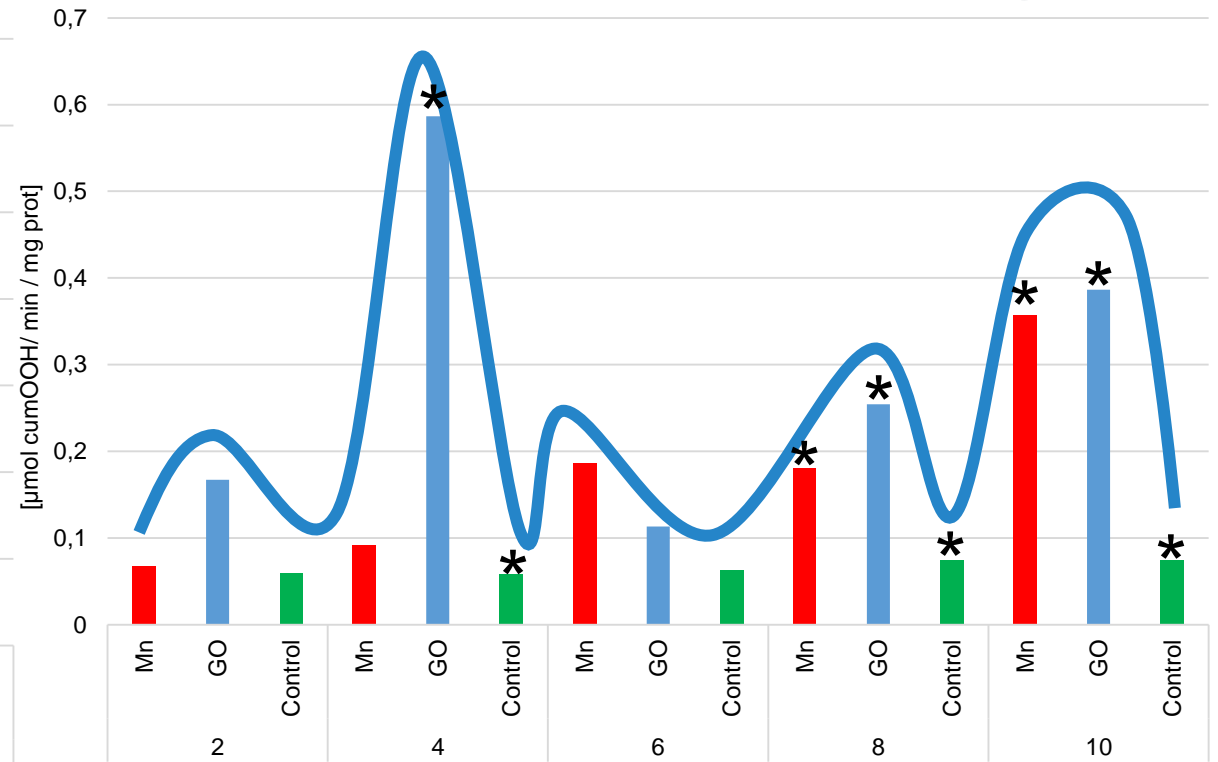
RESULTS



CAT - catalase assay



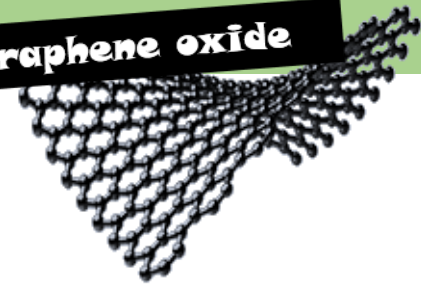
hemolymph



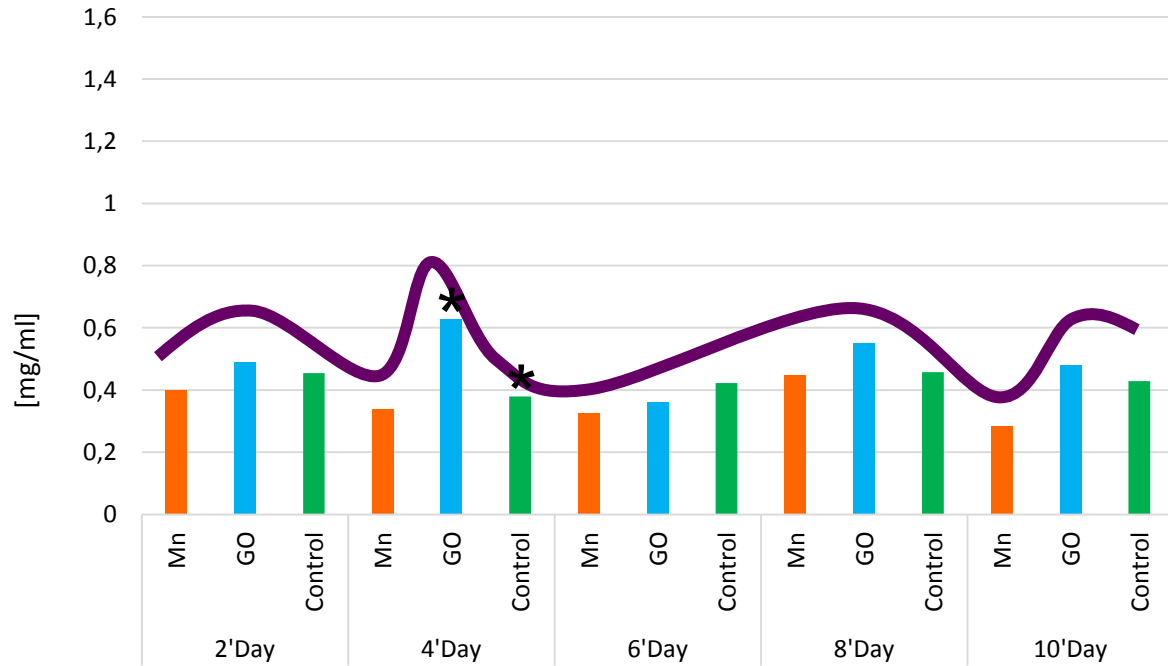
gut

RESULTS

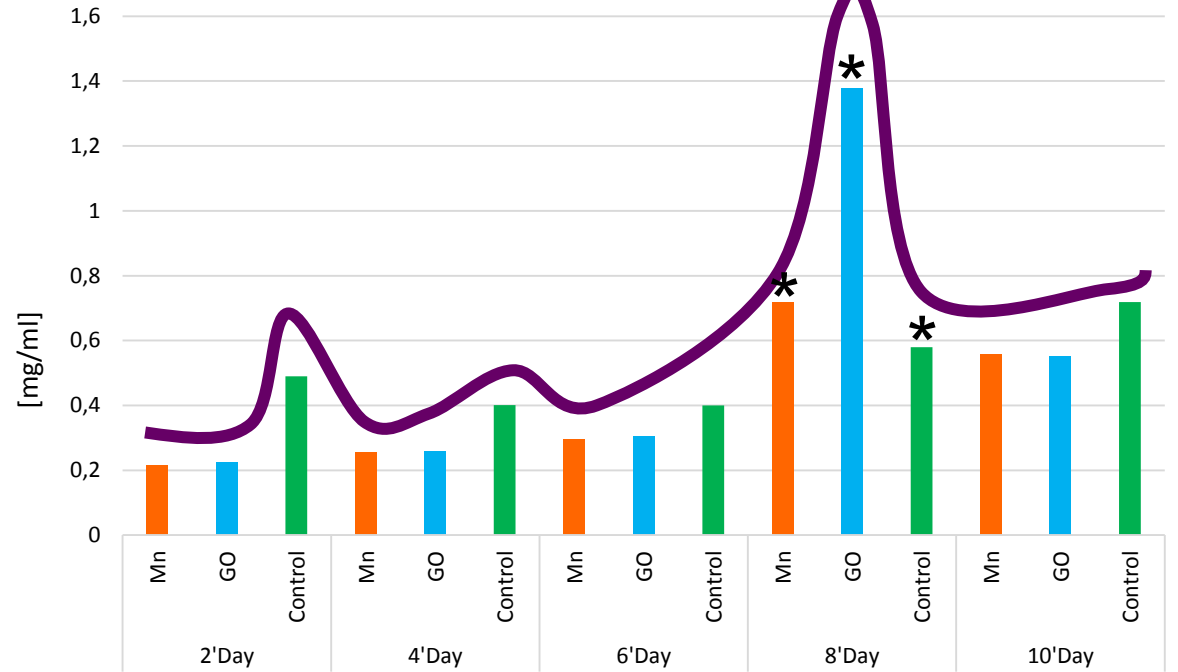
graphene oxide



HSP 70 - heat shock proteins



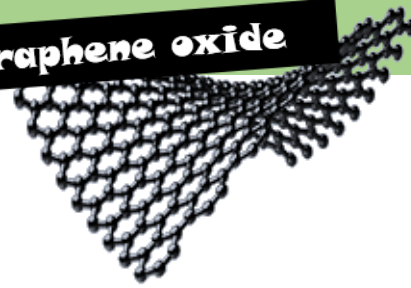
hemolymph



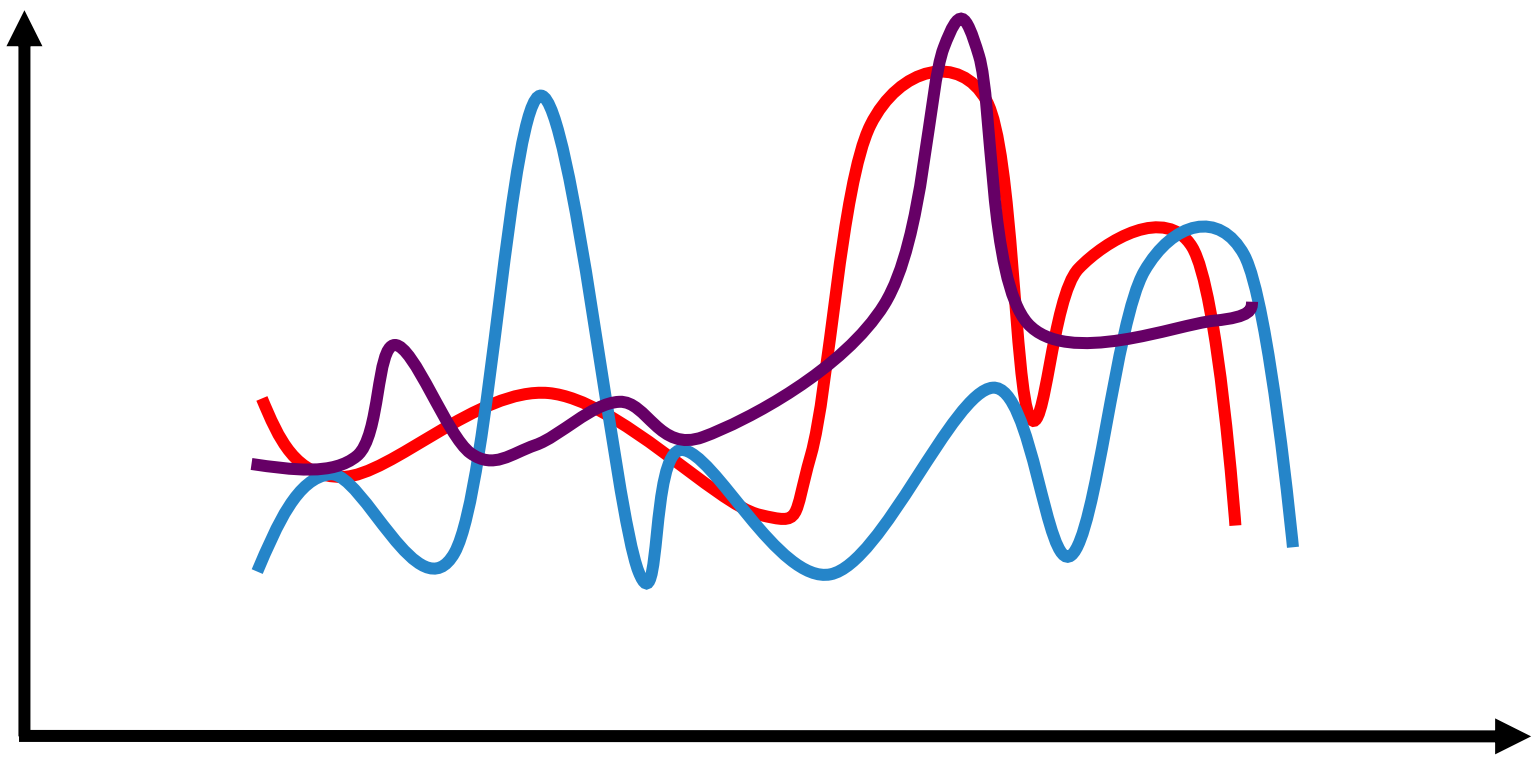
gut

RESULTS

graphene oxide



Stress Parameters



TAC

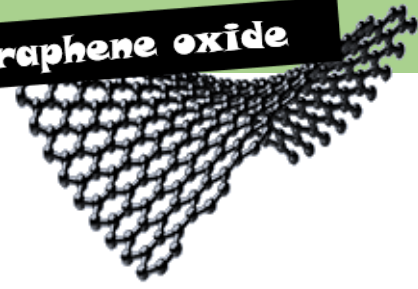
CAT

HSP 70

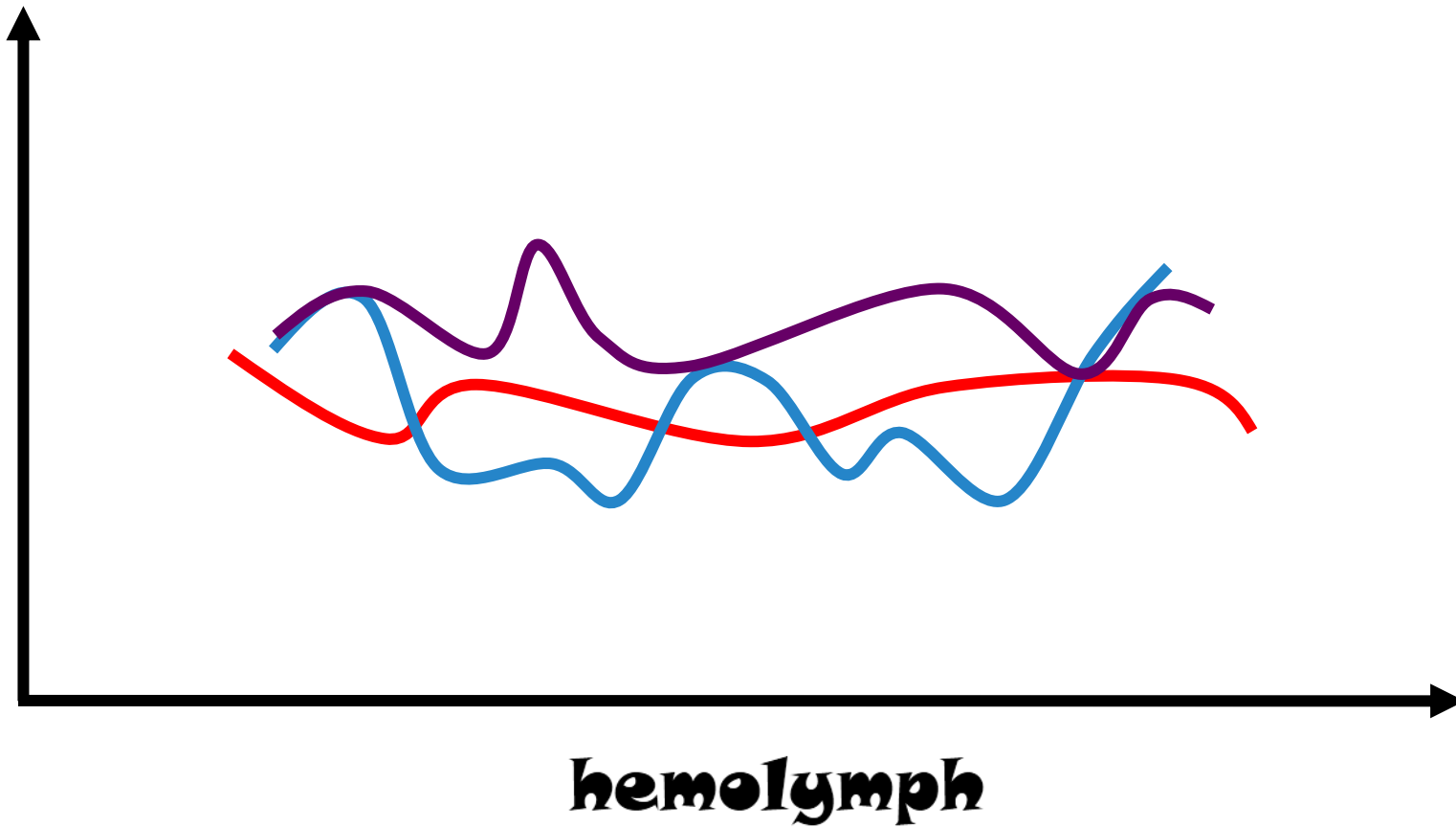
gwt

RESULTS

graphene oxide



Stress Parameters



TAC

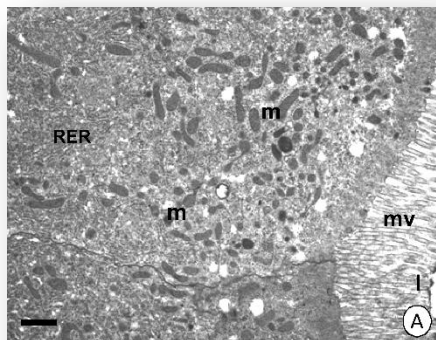
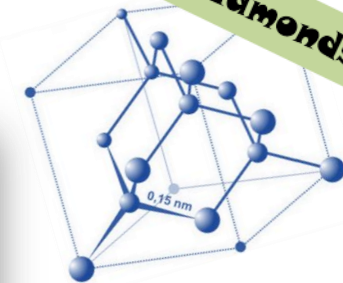
CAT

HSP 70

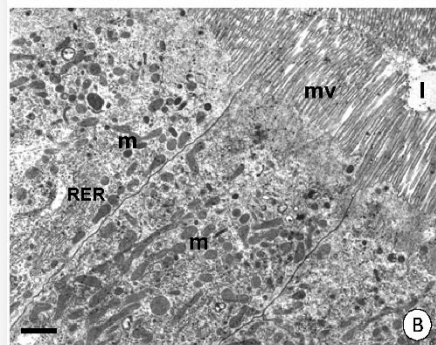
RESULTS

Histology

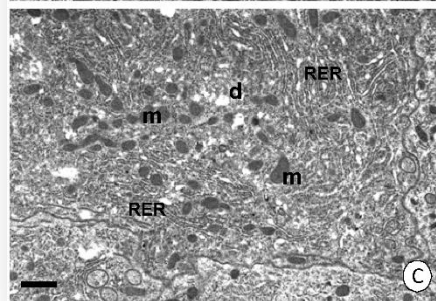
nanodiamonds



- Control -

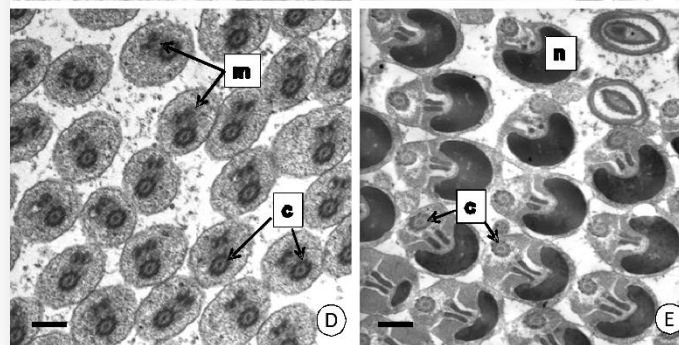
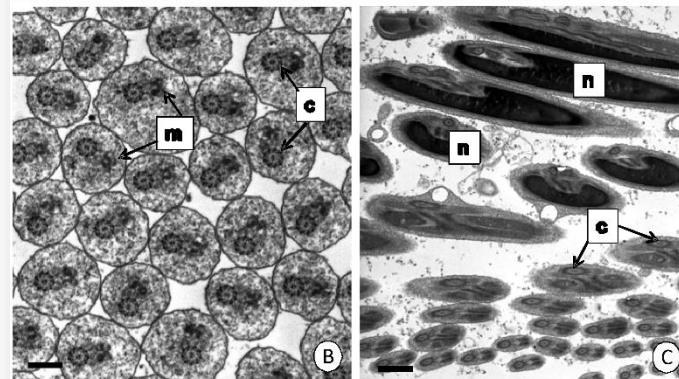
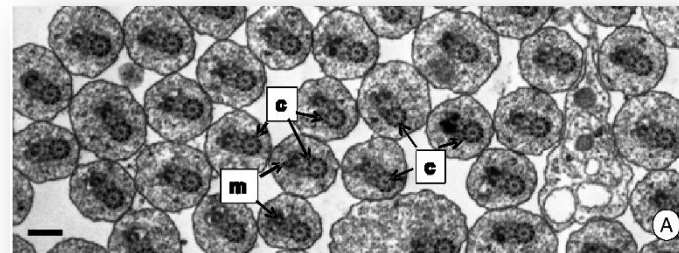


- ND 20 group -



- ND 200 group -

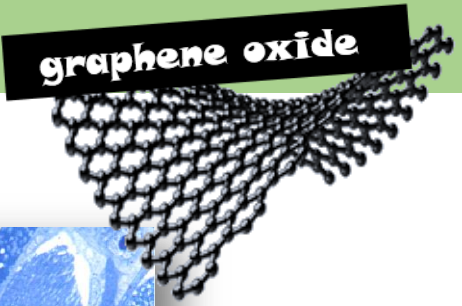
midgut



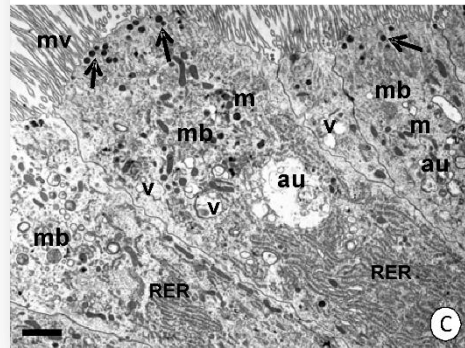
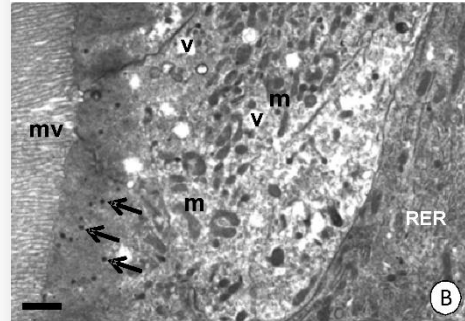
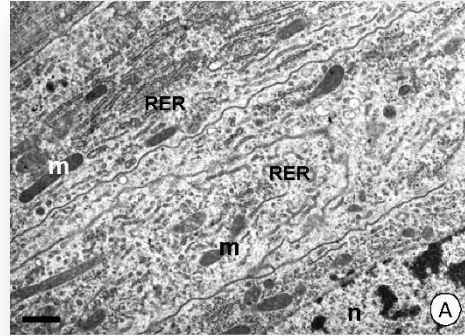
testis

RESULTS

Histology

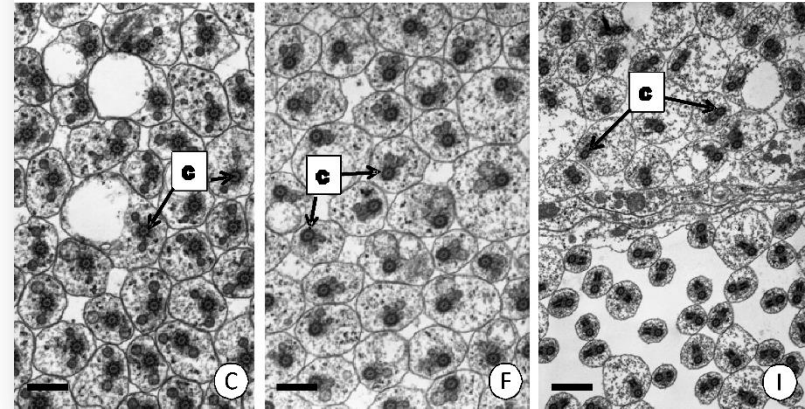
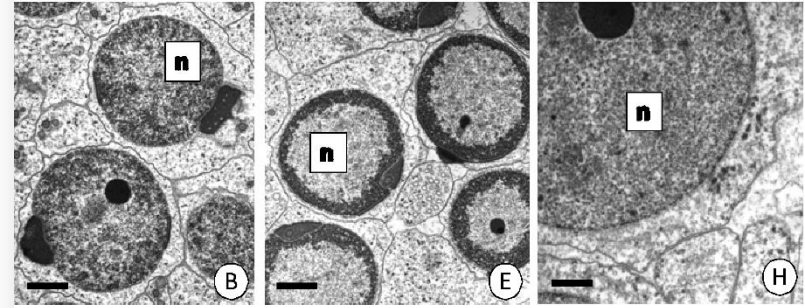
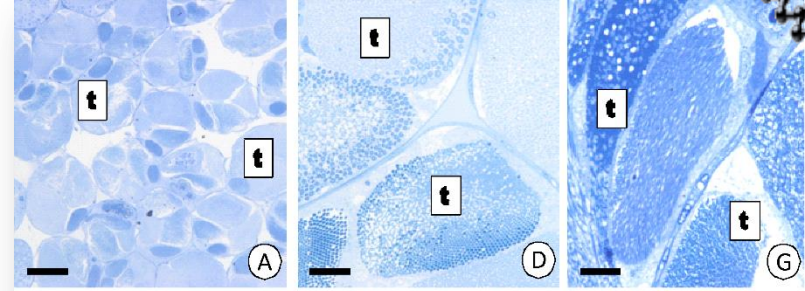


- Control -



midgut

- GO group -

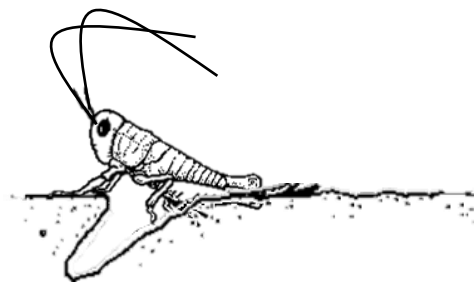
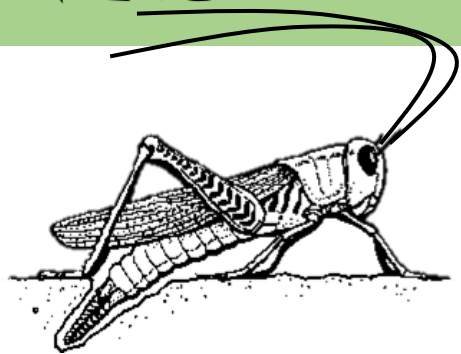


testis

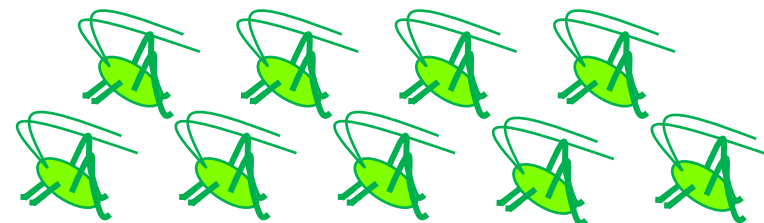
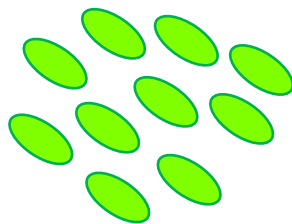
- GO+Mn group -

RESULTS

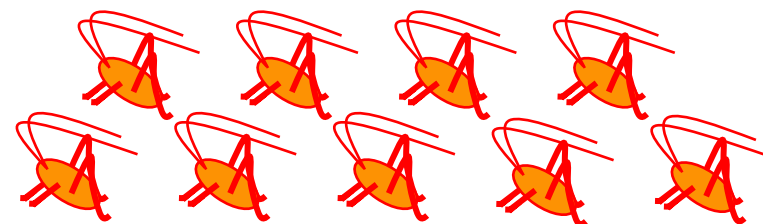
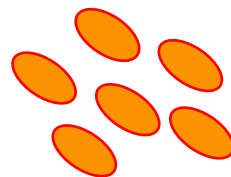
Hatching success



- Control -



- ND group -



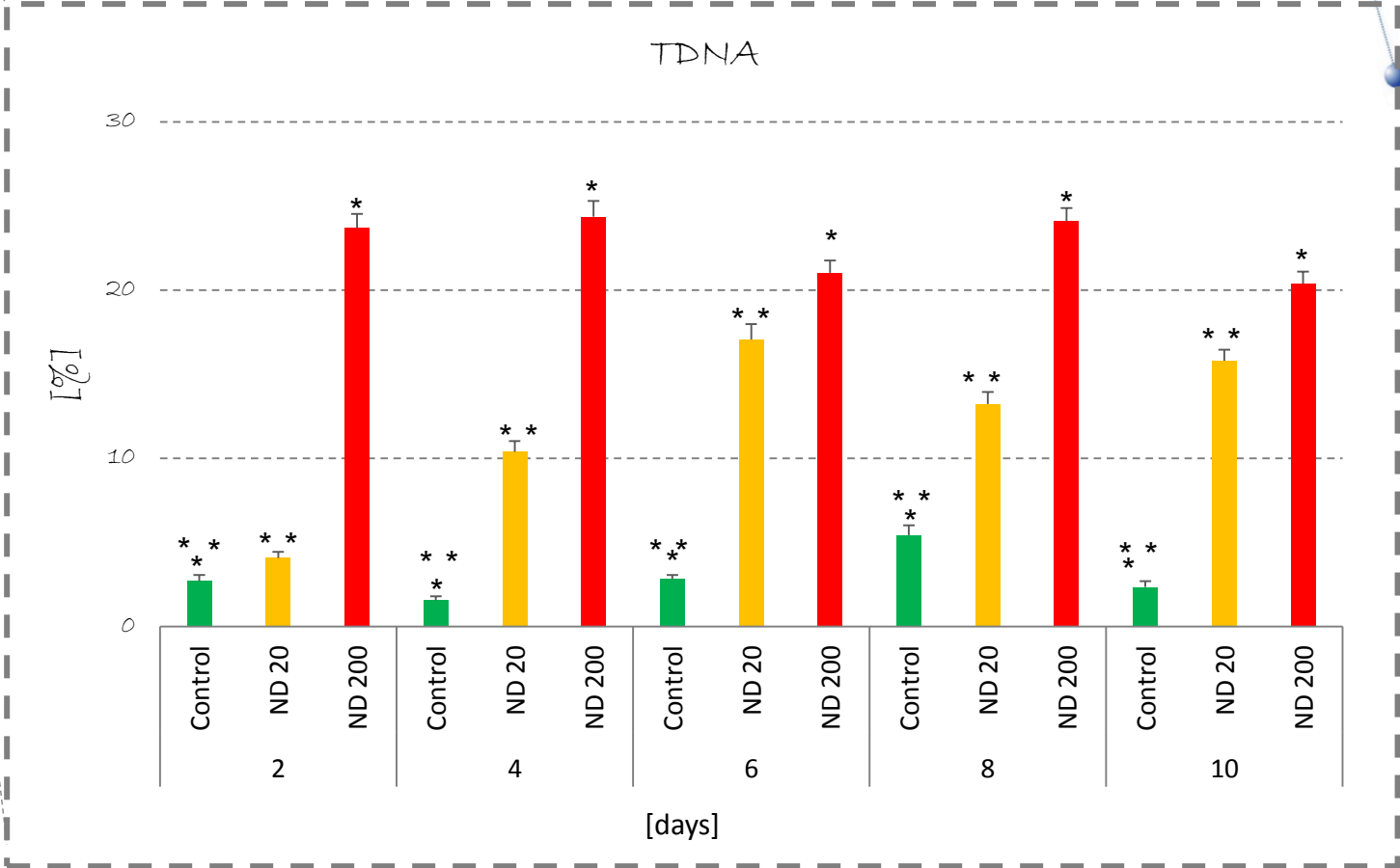
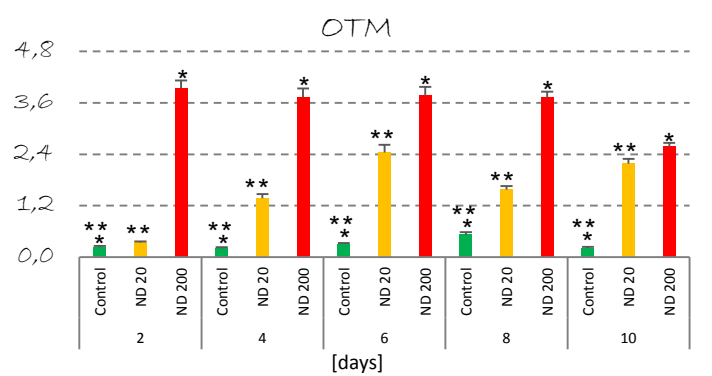
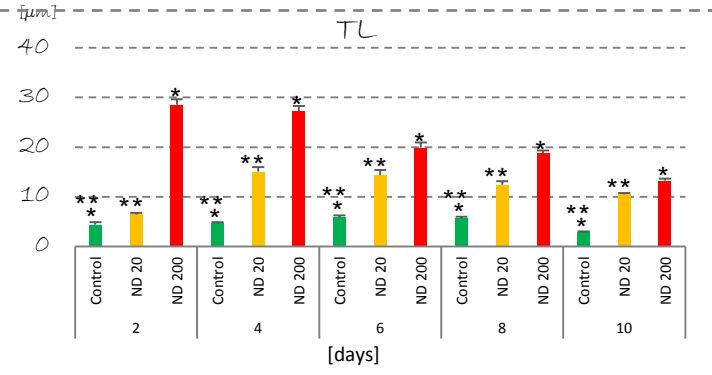
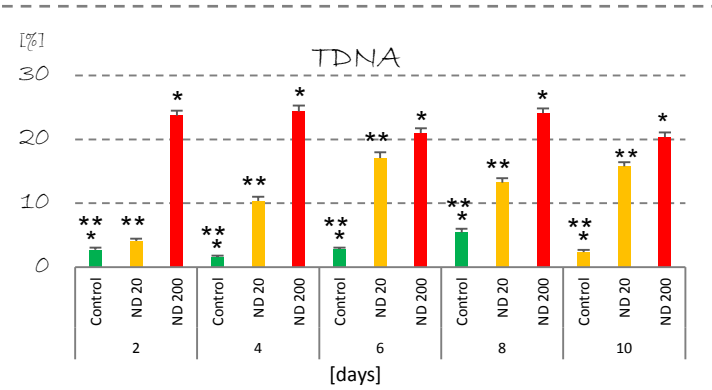
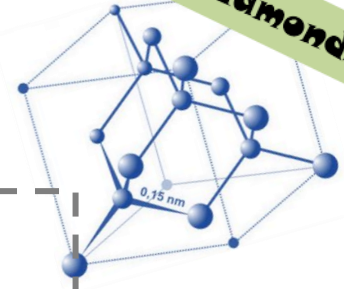
- GD group -



RESULTS

DNA damage

nanodiamonds

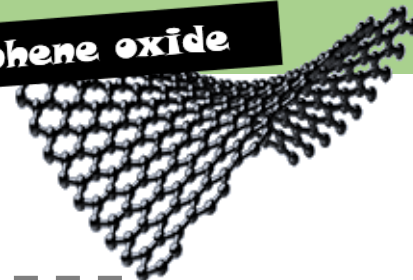


- - control
- - ND 20 group
- - ND 200 group

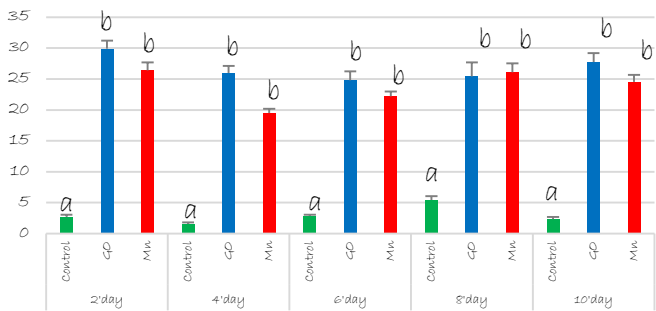
RESULTS

DNA damage

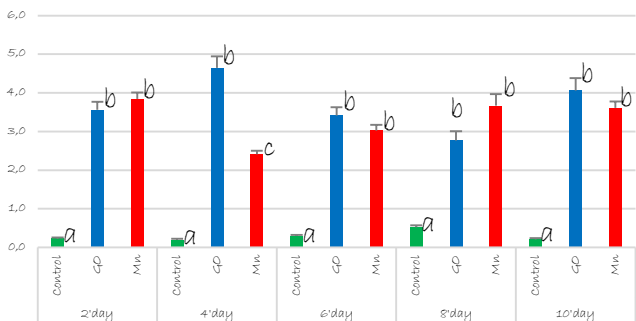
graphene oxide



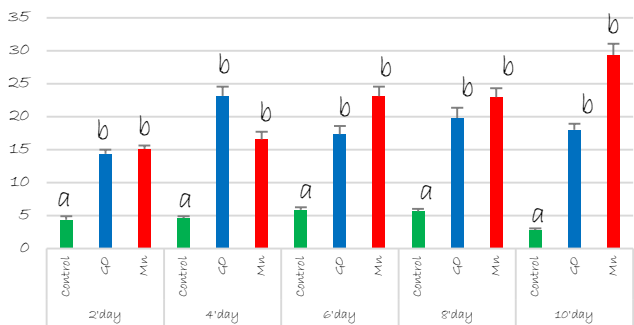
TDNA



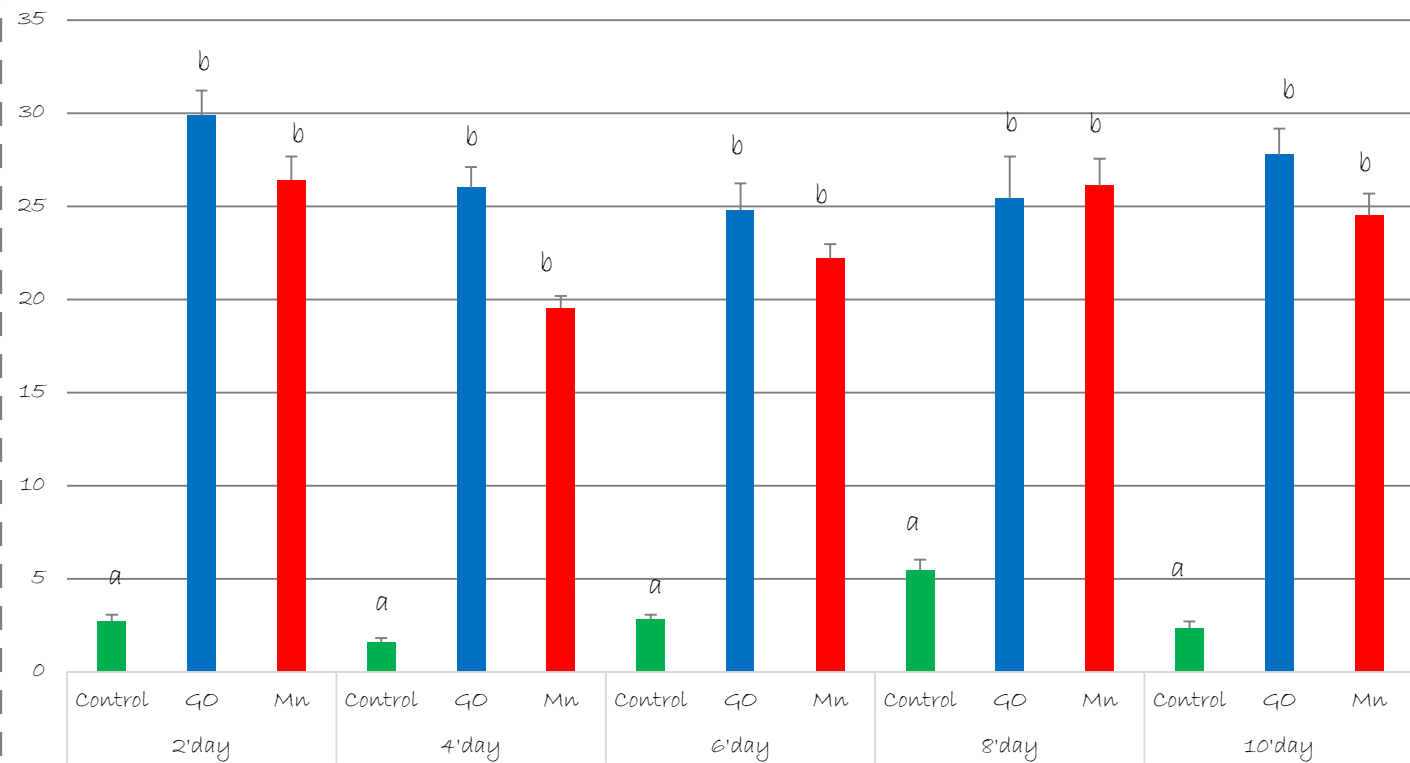
OTM



TL



TDNA



- - control
- - GO group
- - GO + Mn group

CONCLUSIONS

- **Advances in nanotechnology carry a risk of high nanoparticle pollution of the environment**
- **Exposure to nanoparticles is unavoidable, and the knowledge of toxic effects on organisms is still very limited**

While the amount of used nanoparticles rises, nanotoxicological research programs become more important nowadays





Otwarte seminaria 2016

Dziękujemy za uwagę !

mgr Julia Karpeta-Kaczmarek
jukaczmarek@us.edu.pl

mgr Marta Dziewięcka
mdziewiecka@us.edu.pl



Instytut Ekologii Terenów Przemysłowych

Otwarte seminaria 2016

Seminarium było transmitowane on-line przy wykorzystaniu systemu wideokonferencyjnego zakupionego w projekcie **Rozbudowa infrastruktury informatycznej gromadzenia, przetwarzania i analizy danych środowiskowych - in2in**

Projekt realizowany w ramach Programu Operacyjnego Innowacyjna Gospodarka i współfinansowany przez Unię Europejską z Europejskiego Funduszu Rozwoju Regionalnego



in2inIETU

