



ISTITUTO ITALIANO
DI TECNOLOGIA
SMART BIO-INTERFACES

Design of a biomimetic and neuroprotective nanocapsule for the treatment of post-ischemic stroke effects -BIONICS-

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MC – Fabrication of new lipid particles

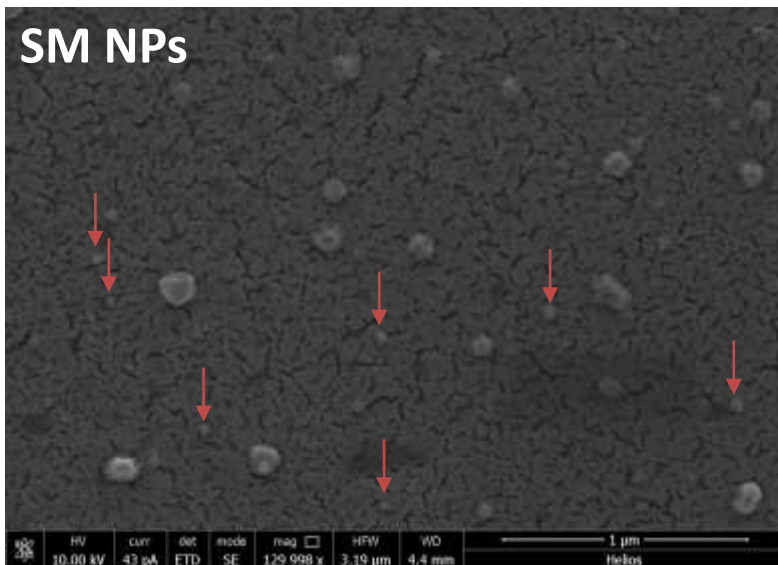
New formulations were tested for the synthesis of new lipid particles

Sample	*GMO (mg)	*SM (mg)	CeO ₂ NPs (5 nm)	mPEG- DSPE (mg)	T80 (1%) (ml)	CHCl ₃
A	30	-	-	4	3	200
B	25	5	-	4	3	200
C	20	10	-	4	3	200
D	15	15	-	4	3	200
E	-	30	-	4	3	200
F	-	30	5	4	3	200

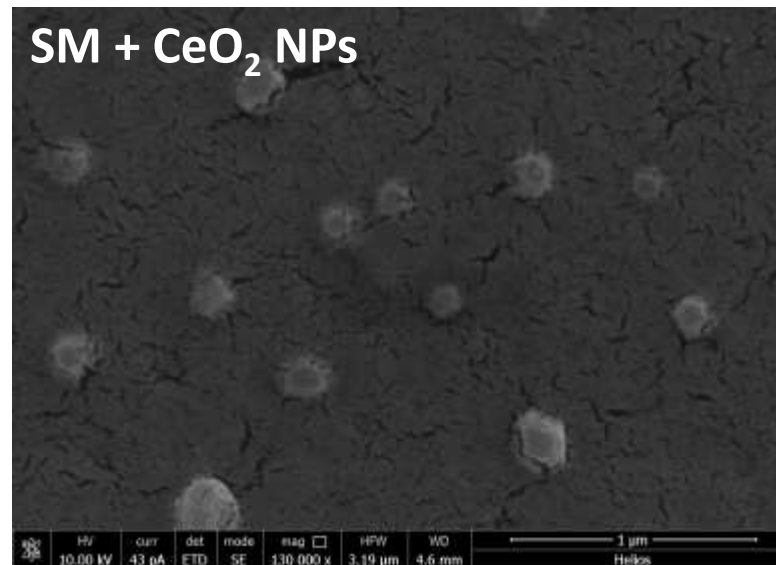
* GMO = glycerol monooleate, SM = sphingomyelin (brain derived)

MC – Fabrication of new lipid particles - SEM

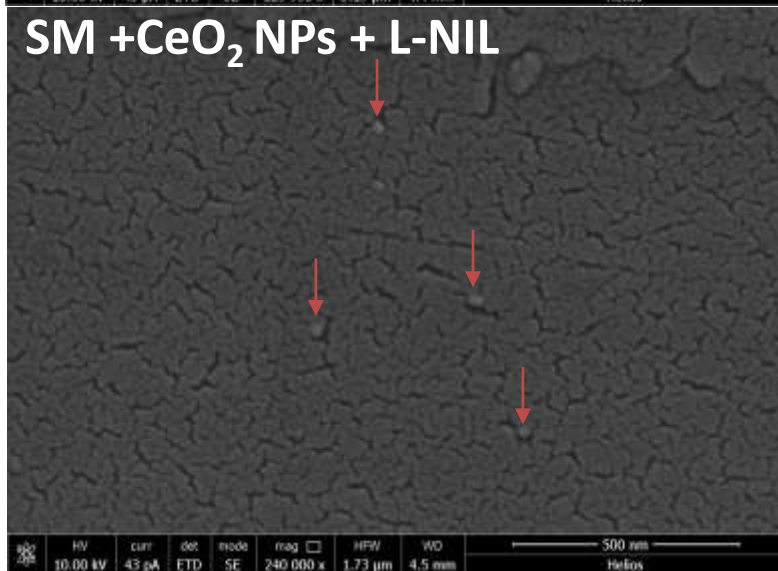
SM NPs



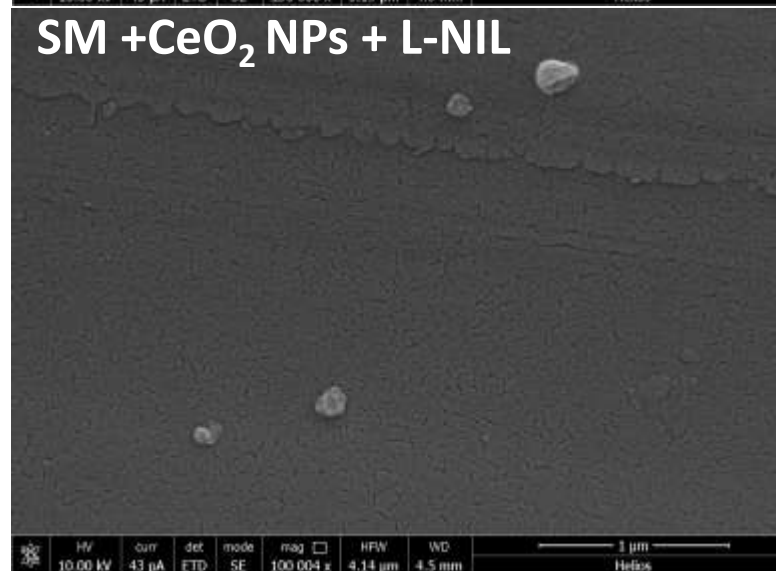
SM + CeO₂ NPs



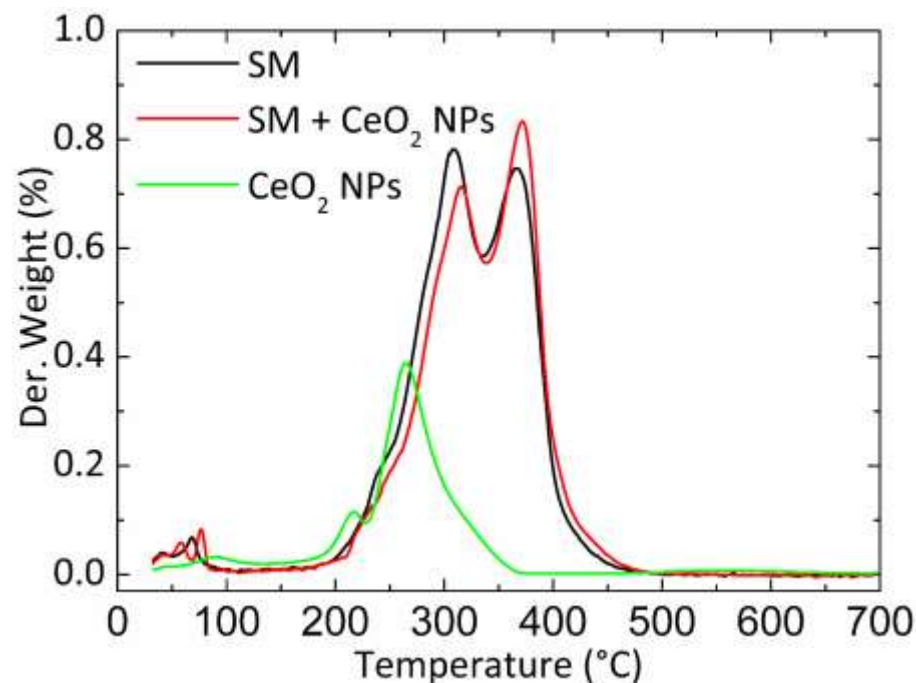
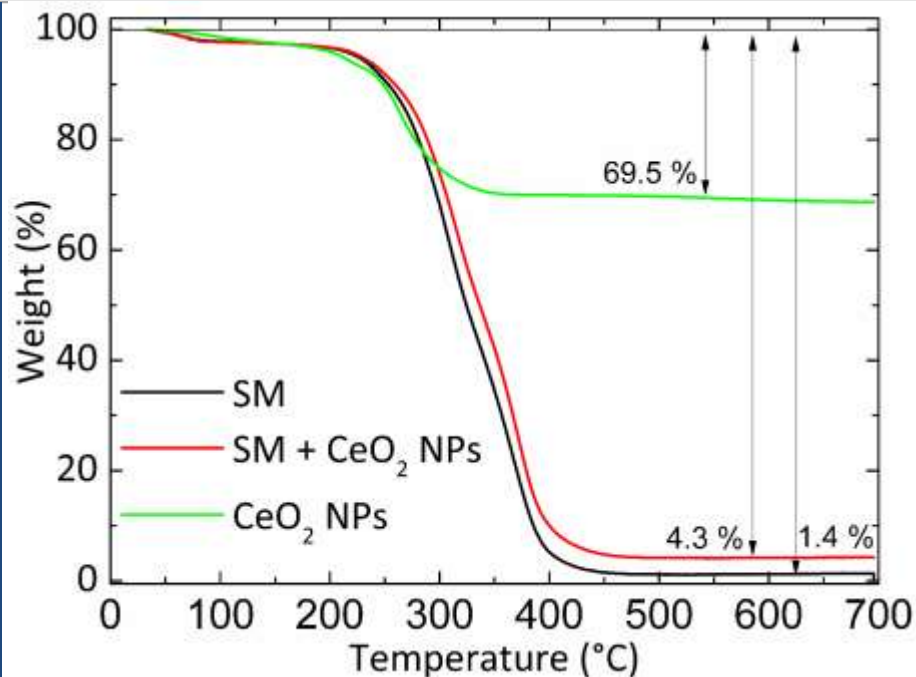
SM + CeO₂ NPs + L-NIL



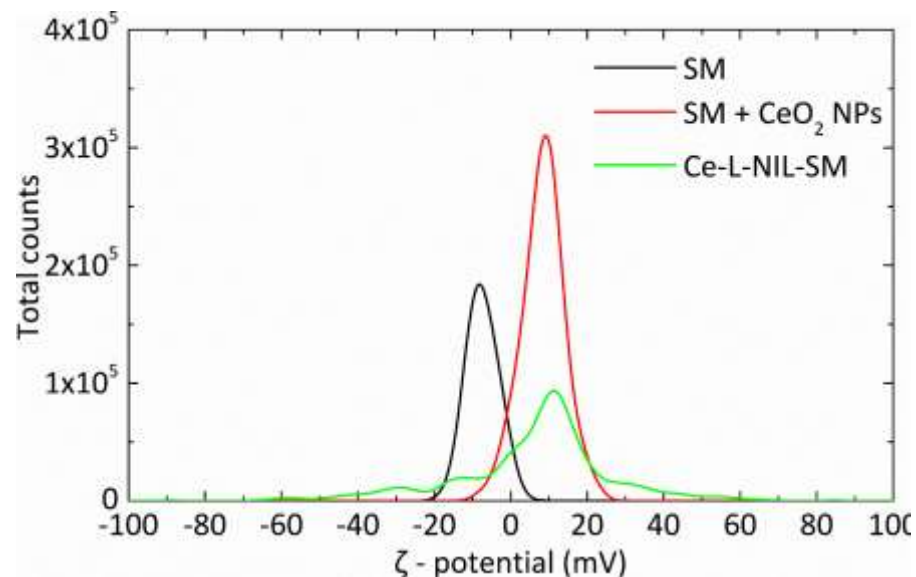
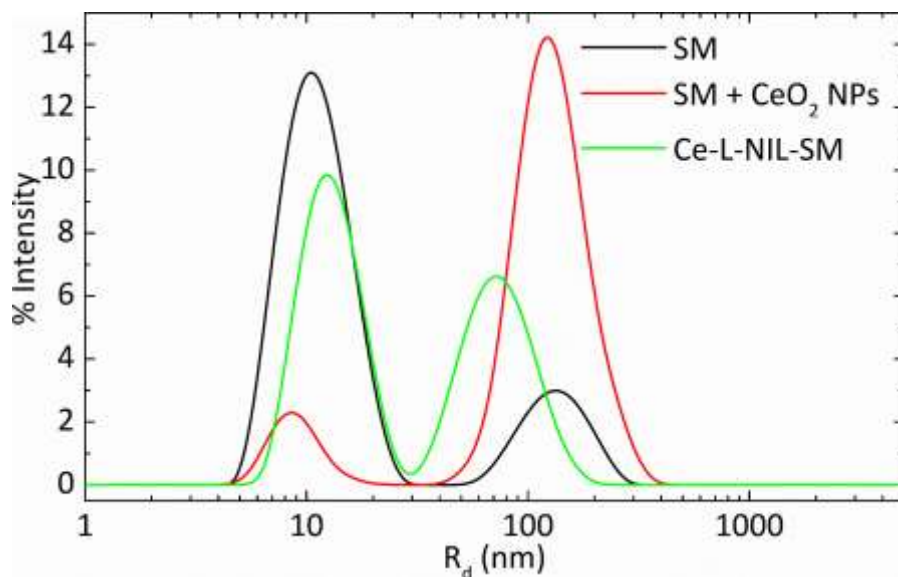
SM + CeO₂ NPs + L-NIL



MC – Fabrication of new lipid particles - TGA



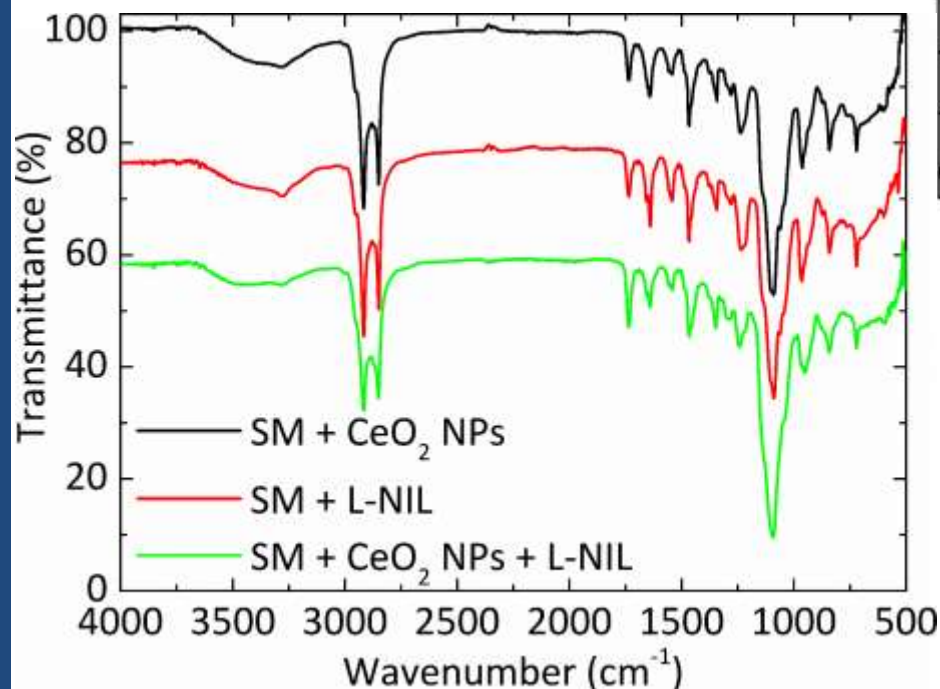
MC – Fabrication of new lipid particles - DLS



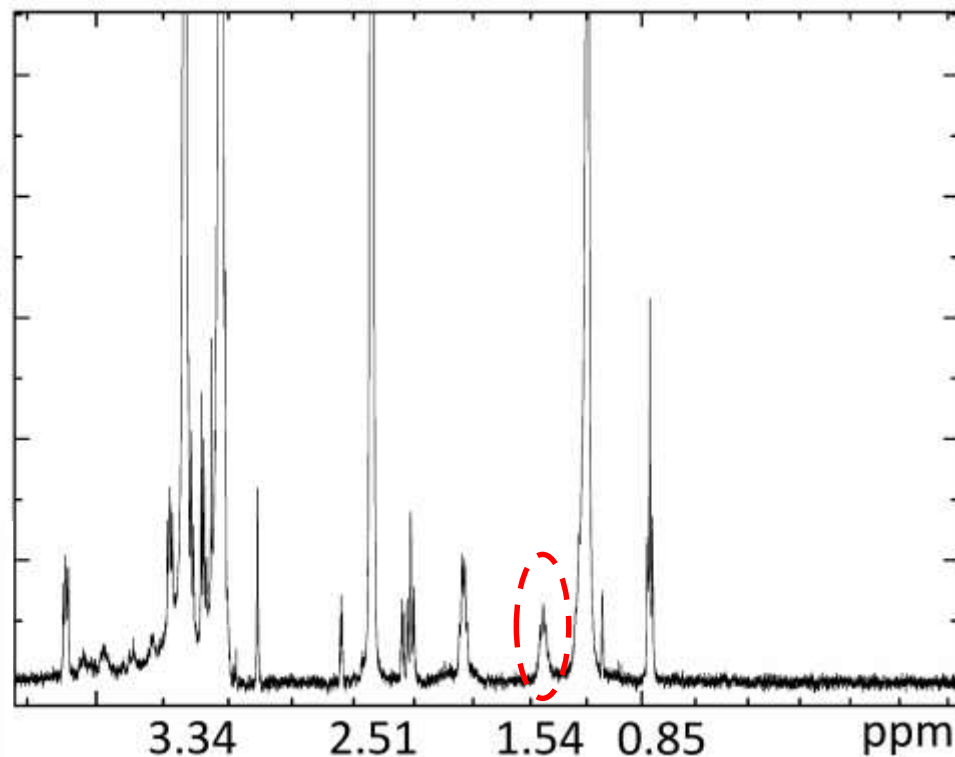
Sample	R_d (nm)	PDI	ζ - potential
SM NPs (083E)	115.80 ± 18.10	0.22 ± 0.03	-7.42 ± 1.03
SM + CeO ₂ NPs (083F)	94.53 ± 18.81	0.49 ± 0.15	10.6 ± 0.58
Ce-L-NIL-SM	30 ± 1.35	0.29 ± 0.02	6.39 ± 0.34

MC – Fabrication of new lipid particles - SEM

NMR spectrum of Ce-L-NIL-SM



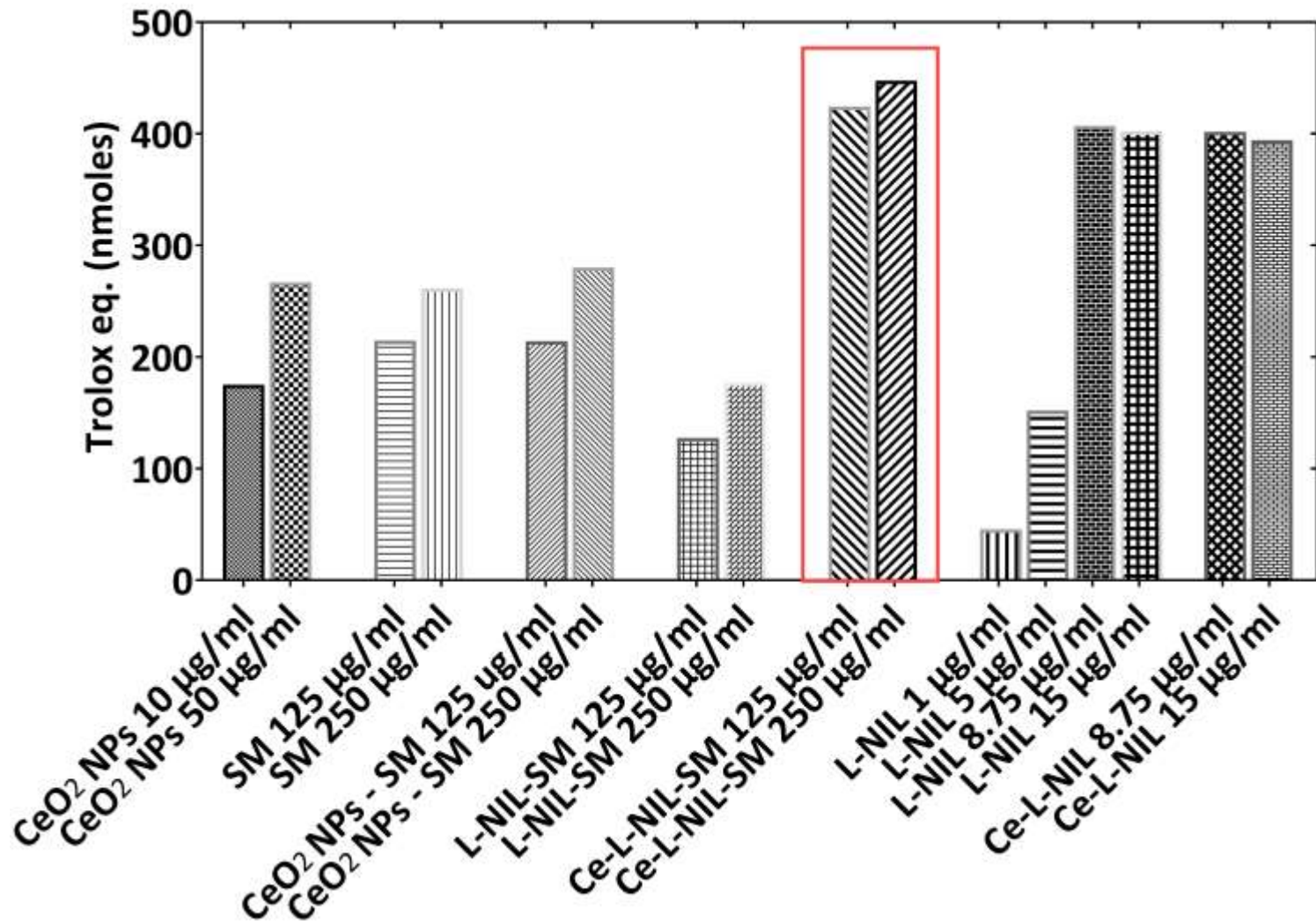
Intensity (a.u.)



FT-IR spectra of SM lipid particles loaded with CeO_2 NPs, SM lipid particles loaded with L-NIL and SM lipid particles loaded with CeO_2 NPs and L-NIL

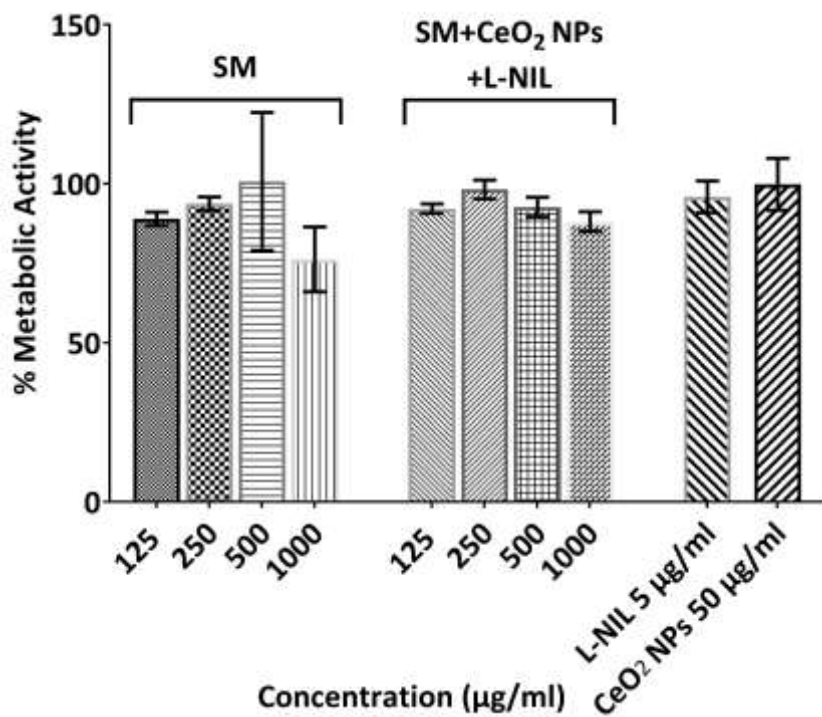
DL% = 7.07

MC – Fabrication of new lipid particles – Antioxidant ability

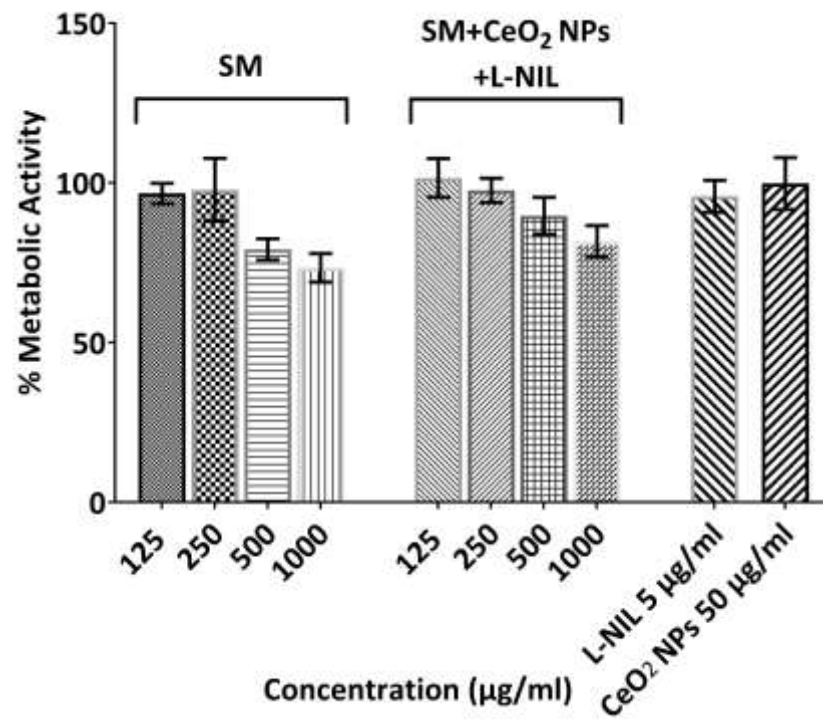


Graph presenting the antioxidant ability of plain SM, plain CeO₂ NPs, plain L-NIL and a combination of them in various concentrations

MC – Fabrication of new lipid particles – Viability studies

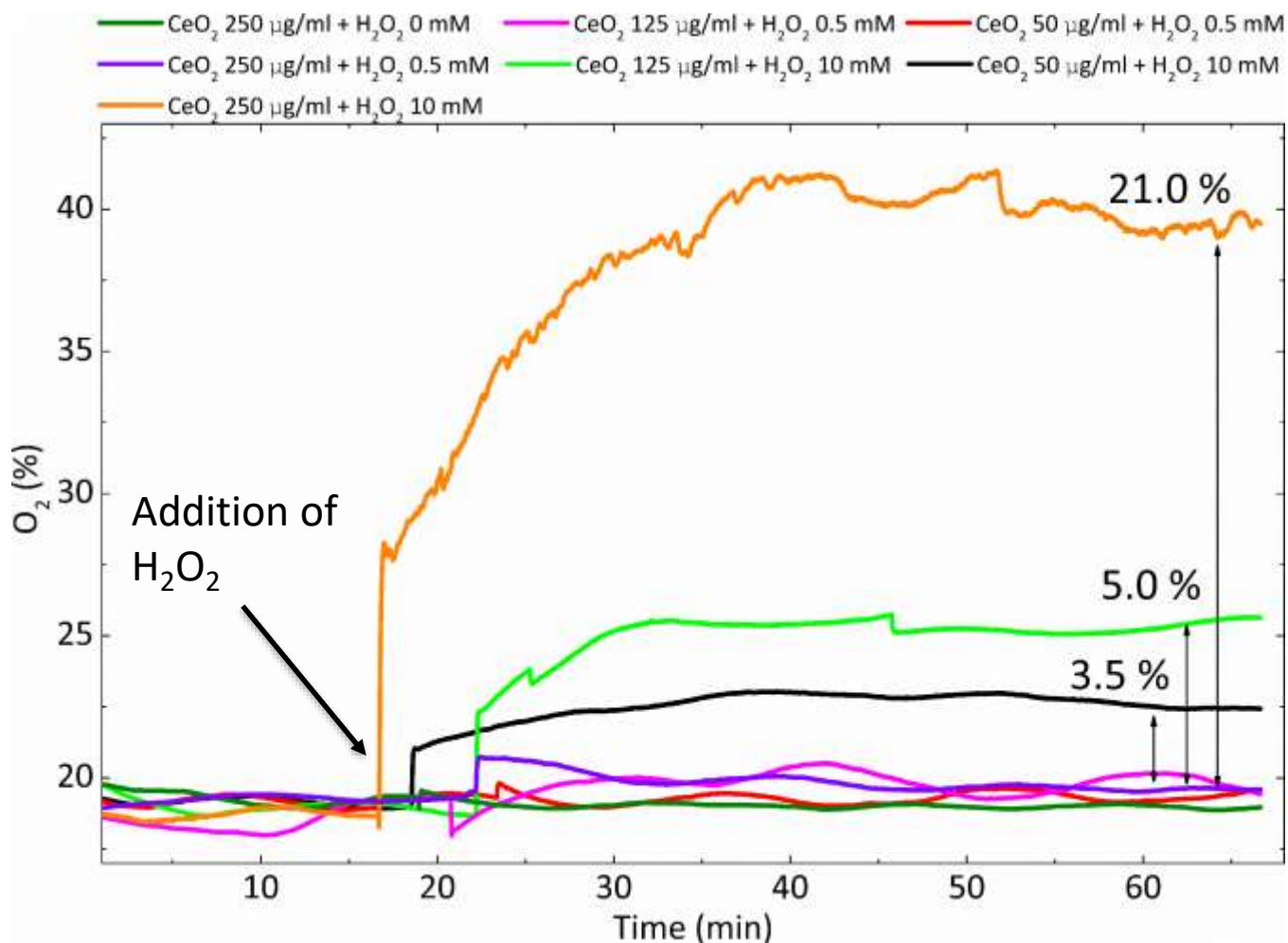


Astrocytes



bEND.3

MC – Fabrication of new lipid particles – Oxygen generation



O_2 generation after the reaction of pure CeO_2 nanoparticles with various concentrations of H_2O_2