

Supplementary information

Reactivity of nanoceria particles exposed to biologically relevant catechol-containing molecules

Gonca Bülbül, Akhtar Hayat, Xiaobo Liu and Silvana Andreescu

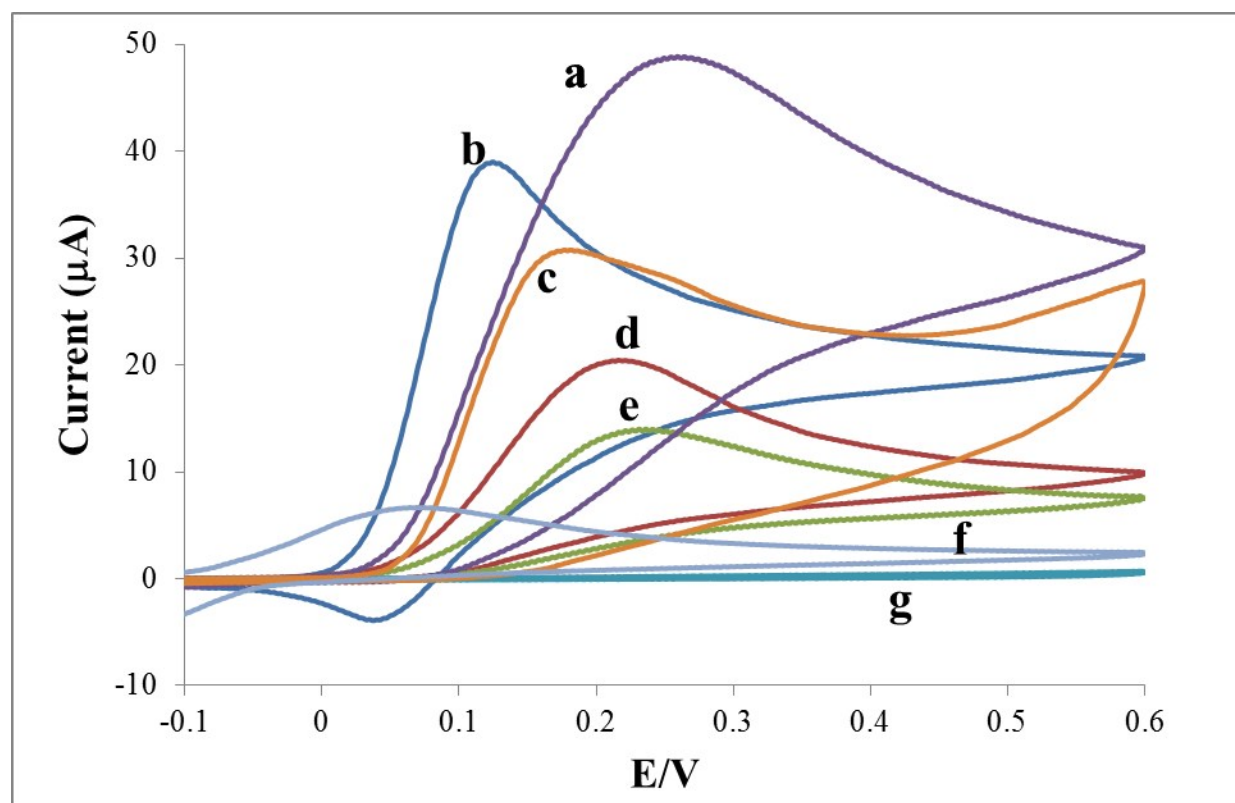


Figure S1. Electrochemical behavior of the representative molecules (1.5 mM) tested in this work, recorded using screen printed electrodes: a) norepinephrine, b) dopamine, c) serotonin, d) epinephrine, e) L-DOPA, f) DOPAC and g) phenylalanine.

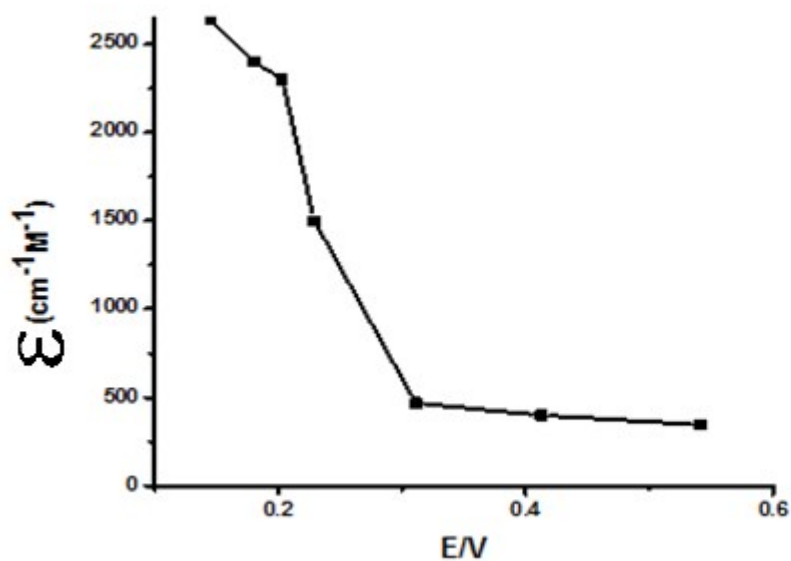


Figure S2. Correlation of the extinction coefficient values of catecholic molecules exposed to nanoceria particles (e.g. catechol-nanoceria complexes) versus the oxidation potential (E_{oxi}) of these molecules, from low to high E_{oxi} : catechol, ascorbic acid, 1-naphthol, hydroquinone, bisphenol A, phenol, ochratoxin A in that order.

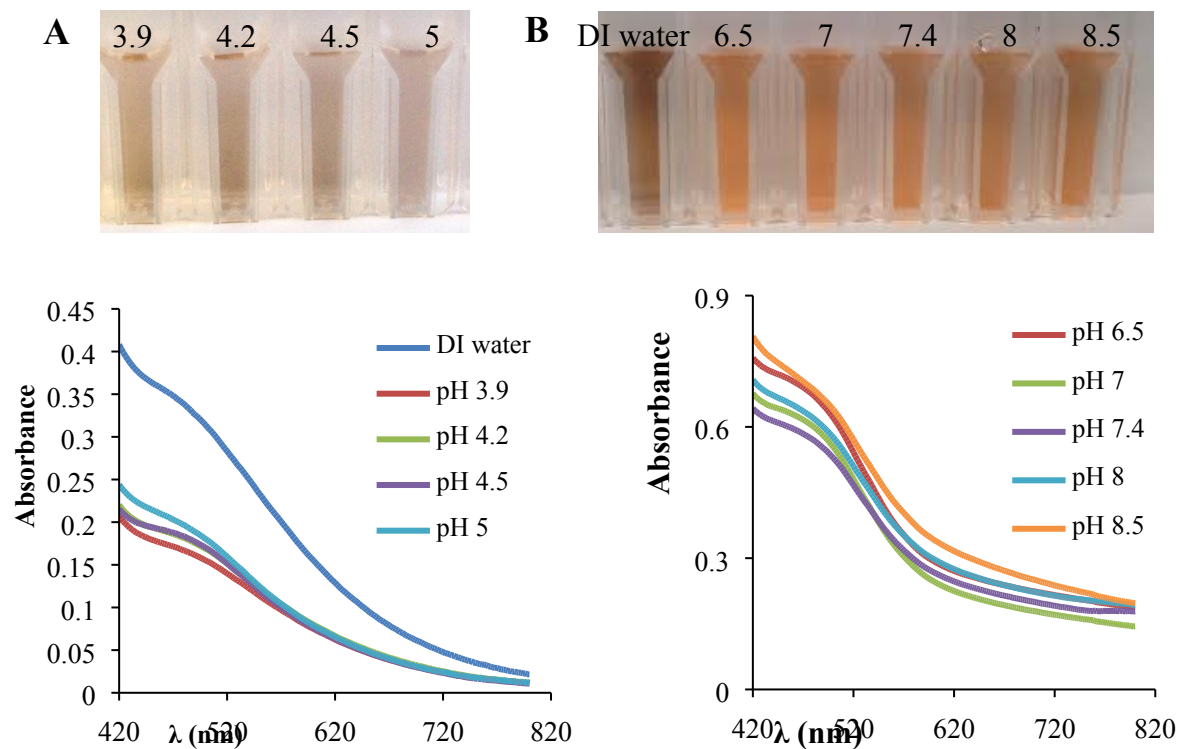


Figure S3. Interaction of nanoceria with L-dopa (0.1 mM) at varying pH values in A) acetate and B) phosphate buffers.

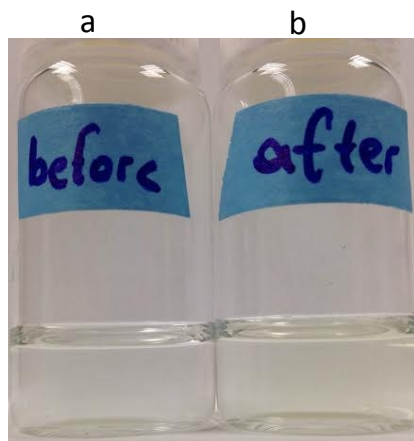


Figure S4. Interaction of nanoceria (5 mg/mL) with benzoquinone (0.5 mM); a) free benzoquinone and b) benzoquinone after incubation with particles.

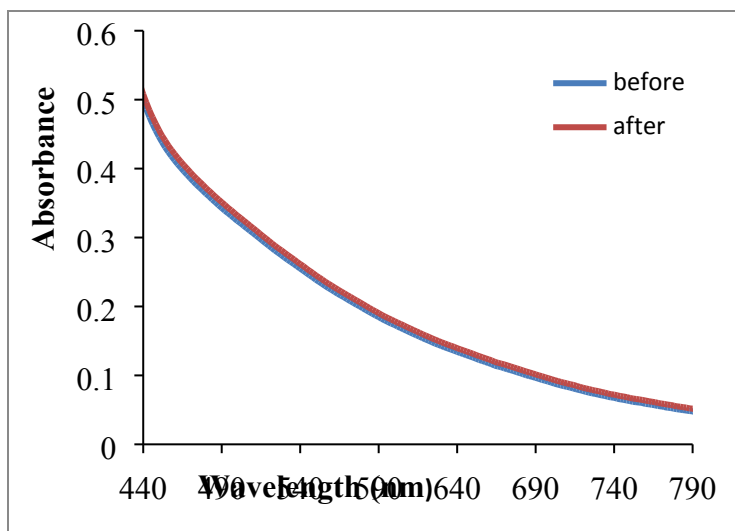
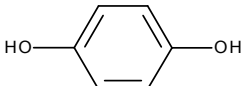
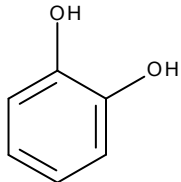
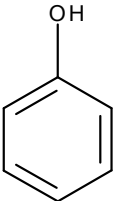
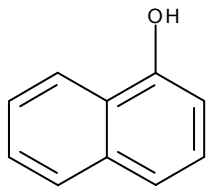
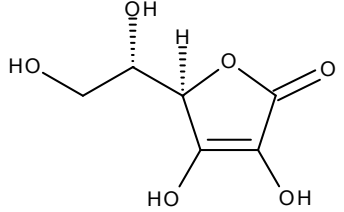
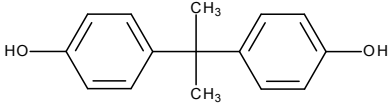
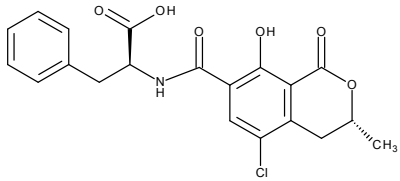
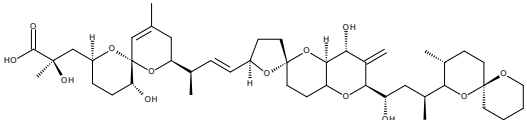
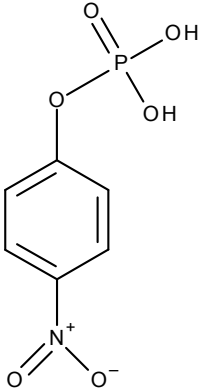
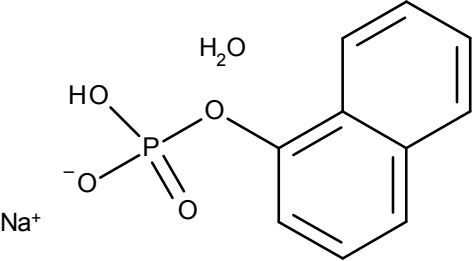
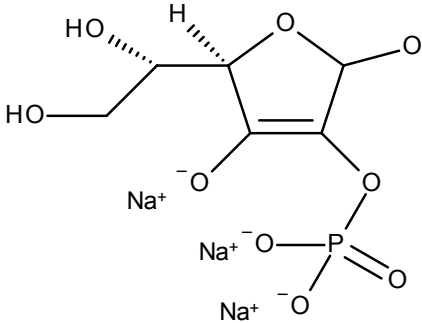


Figure S5. Absorption spectra of L-DOPA (0.1 mM) in the presence of nanoceria (5 mg/mL) before and after application of electrochemical potential.

Table S1. Summary of the chemical structures and the main characteristics of molecules from the catechol family and related aromatic compounds studied.

Molecule name/ Chemical structure	Extinction Coefficient of Complex (cm ⁻¹ M ⁻¹)	Electrochemical stability	Redox potential	Complex Formation/ Adsorption
Hydroquinone 	1500	Active	0.229V	Complex Formation
Catechol 	2638.9	Active	0.145V	Complex Formation
Phenol 	400	Active	0.412V	Complex Formation
1-naphthol 	2302.5	Active	0.203V	Complex Formation
Ascorbic acid 	2400	Active	0.180V	Complex Formation
Bisphenol A 	468.1	Active	0.311V	Complex Formation

<p style="text-align: center;">Ochratoxin A</p> 	346.1	Active	0.541V	Complex Formation
<p style="text-align: center;">Okadaic acid</p> 	N/A	Inactive	N/A	Adsorption
<p style="text-align: center;"><i>p</i>-nitrophenyl phosphate</p> 	N/A	Inactive	N/A	Adsorption
<p style="text-align: center;">1-naphthylphosphate</p> 	N/A	Inactive	N/A	Adsorption
<p style="text-align: center;">Ascorbic-2-phosphate</p> 	N/A	Inactive	N/A	Adsorption