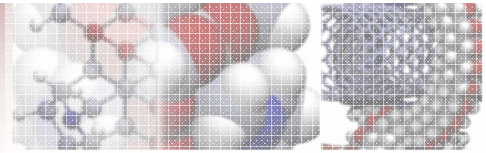

Inulins as new nanostructured materials for the design of enantioselective sensors

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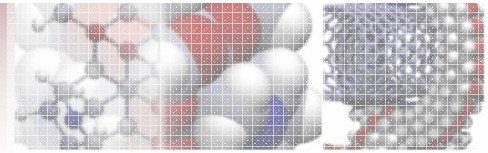
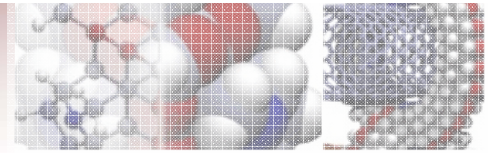
INCEMC



MAIN FIELDS OF APPLICATION

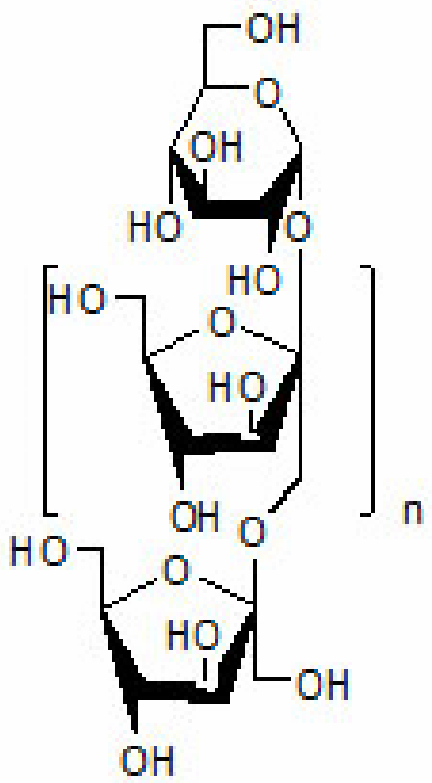
- Clinical analysis;
- Pharmaceutical analysis.



CHIRAL SELECTORS USED IN THE DESIGN OF ELECTRODES

1. CROWN ETHERS
2. CYCLODEXTRINS
3. MALTODEXTRINS
4. QUININE AND ITS DERIVATIVES
5. QUINIDINE AND ITS DERIVATIVES
6. FULLERENS
7. INULINS

Inulins



DESIGN OF THE SENSORS

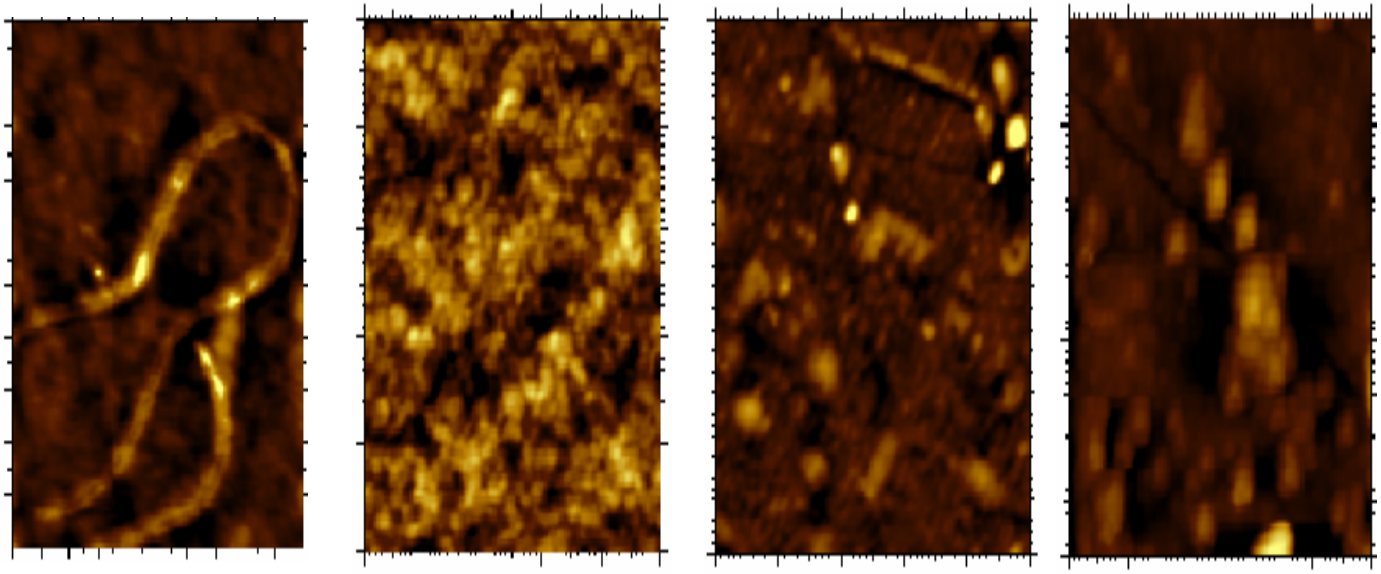
Chiral selector:

Frutafit IQ (IQ),
Frutafit HD (HD),
Frutafit TEX (TEX) si
Inutec (IN).

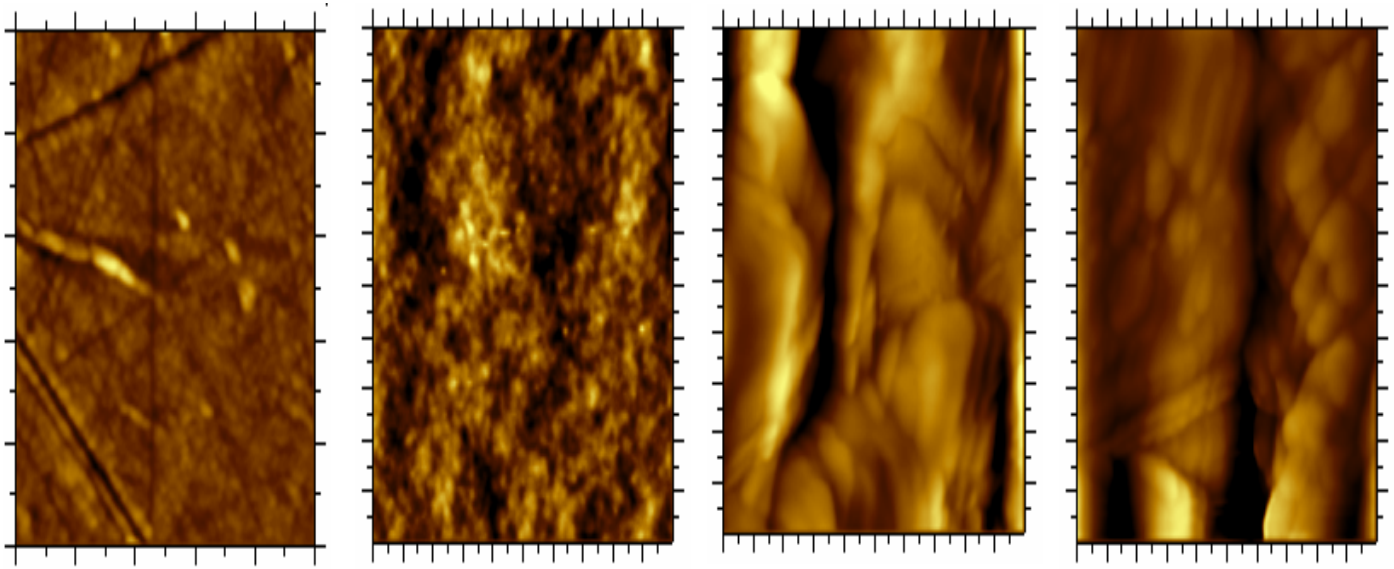
Diamond/graphite powder

Paraffin oil

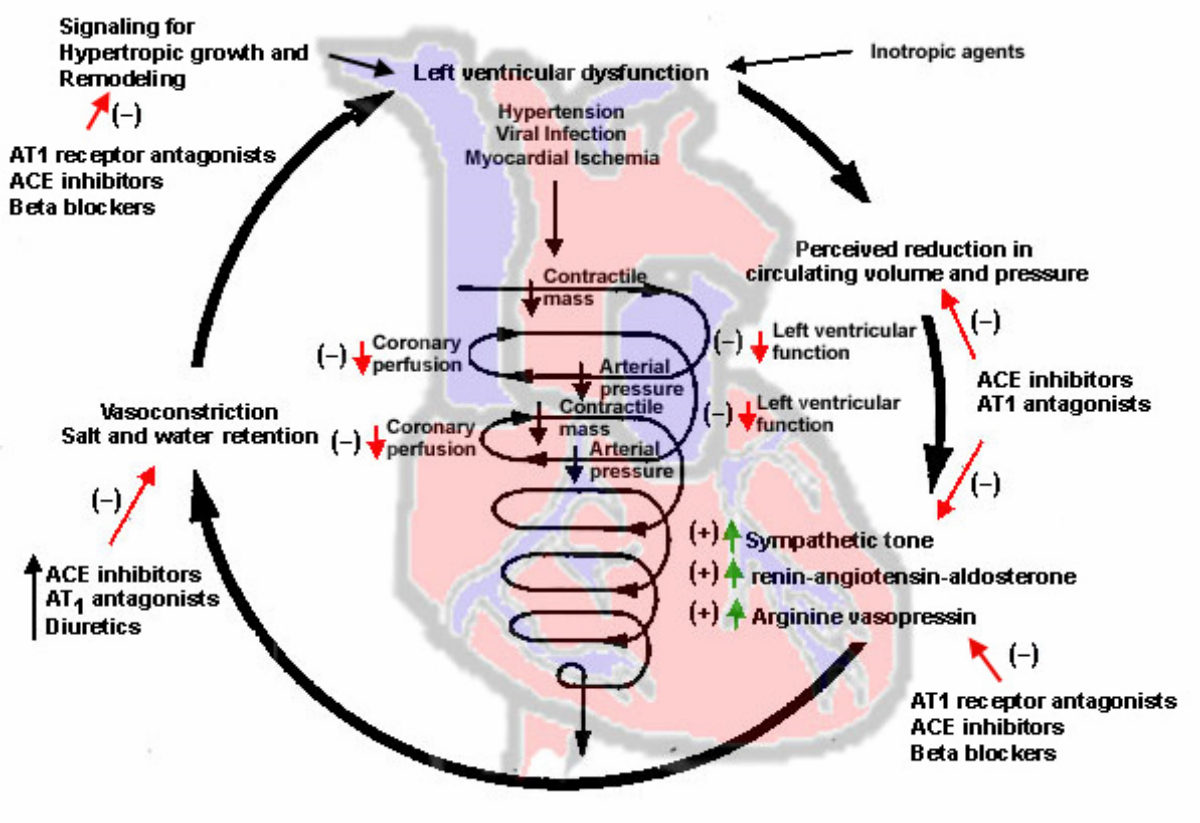
CARBON PASTE BASED SENSORS

Inulin	IQ	IN	HD	TEX
Sq (nm)	0.184	0.253	1.02	1.87
AFM img 2D (1X1 µm)				

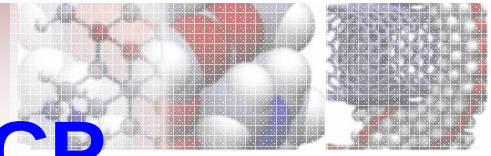
DIAMOND PASTE BASED SENSORS

Inulina	IQ	IN	HD	TEX
Sq (nm)	0.352	0.28	22.2	22.3
AFM img 2D (1X1 µm)				

S-Captopril – ACE inhibitor

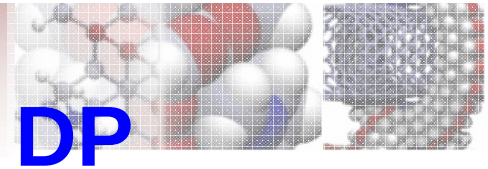


Response Characteristic CP



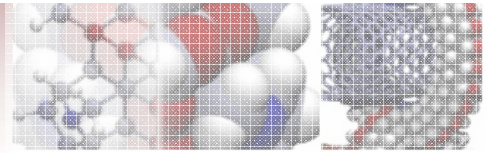
Inulin	IN	HD	TEX
Equation of calibration	$H=8.98\times10^{-9}+10.86\times c$ R=0.996	$H=2.50\times10^{-10}+0.007\times c$ R=0.993	$H=1.46\times10^{-9}+0.034\times c$ R=0.980
LCR (mol/L)	10^{-10} – 10^{-8}	10^{-10} – 10^{-5}	10^{-9} – 10^{-7}
DL (mol/L)	7.04×10^{-11}	8.38×10^{-11}	7.51×10^{-10}
Sensitivity	10.86 nA/µmol/L	7.02 pA/µmol/L	0.034 nA/µmol/L
E (mV)	250±5	250±3	220±4

Response Characteristics DP



Inulin	Equation of calibration	LDC(mol/L)	LD (mol/L)	Sensitivity	E (mV)
IN	$H=8.81\times10^{-12}+0.031\times c$ $R=0.998$	$10^{-10} – 10^{-8}$	6.58×10^{-12}	0.031 nA/μmol/L	300±7
HD	$H=1.39\times10^{-8}+0.009\times c$ $R=0.919$	$10^{-10} – 10^{-6}$	1.79×10^{-11}	9.25 pA/μmol/L	150±7
TEX	$H=8.58\times10^{-12}+0.003\times c$ $R=0.917$	$10^{-9} – 10^{-7}$	4.59×10^{-11}	3.81 pA/μmol/L	200±5
IQ	$H=2.15\times10^{-7}+2.10\times c$ $R=0.917$	$10^{-9} – 10^{-5}$	3.71×10^{-10}	2.10 nA/μmol/L	570±7

Selectivity

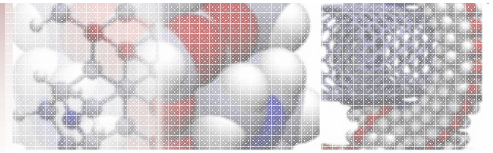


Inulin	Matrix	R-Cpt	LHP
IN	CP	1.98	4.78
	DP	1.59	2.51
HD	CP	2.41	1.19
	DP	4.57	1.26
TEX	CP	2.33	1.25
	DP	2.35	0.93
IQ	DP	1.51	1.38

Uniformity Content Test

Enantioselective sensor	%, Recovery, S-Cpt
IN&CP	92.24 ± 0.21
IN&DP	91.68± 0.12
HD&CP	96.15± 0.04
HD&DP	97.13± 0.09
TEX&CP	98.34± 0.24
TEX&DP	91.83± 0.05

Conclusions



Utilization of these electrodes has several advantages:

- Low cost
- No or very simple sample preparation
- Short time of analysis
- Simplicity of analysis
- High reliability of the analysis

The proposed electrodes showed :

- Good enantioselectivity
- No any special pre-treatment before analysis