

Table of Contents

Preamble.....	I
Abstract.....	I
Resum	III
Resumen	VI
Table of Contents.....	X
Chapter 1:Elemental Concepts.....	22
1.1 Nanotechnology and nanomaterials.....	2
1.2 Hybrid materials.....	8
1.3 2D Silica-based hybrid materials.....	5
1.4 3D Silica-based hybrid materials.....	19
1.5 Gated Materials.....	29
Chapter 2: Objectives	73
Chapter 3: Chromogenic detection of aqueous formaldehyde using functionalized silica nanoparticles.....	79
3.1 Manuscript	81
3.2 Supporting Information	95
Chapter 4: Acetylcholinesterase-capped Mesoporous Silica Nanoparticle for detecting its inhibitors	107
4.1 Acetylcholinesterase capped mesoporous silica nanoparticles that open in the presence of diisopropylfluorophosphate (a Sarin or Soman simulant)	109
4.1.1 Manuscript	111
4.1.2 Supporting Information	127

4.2 Acetylcholinesterase-capped mesoporous silica nanoparticles controlled by the presence of inhibitors.....	145
4.2.1 Introduction	147
4.2.2 Results and discussion	151
4.2.3 Conclusions.....	168
4.2.4 Experimental section	169
Chapter 5: Oligonucleotide-capped mesoporous silica nanoparticles as DNA-responsive dye delivery systems for genomic DNA detection.....	179
5.1 Manuscript.....	181
5.2 Supporting Information	191
Chapter 6: MUC1 aptamer-capped mesoporous silica nanoparticles for controlled drug delivery and radio-imaging applications.....	205
6.1 Introduction	207
6.2 Results and discussion	212
6.3 Conclusions.....	224
6.4 Materials and methods.....	225
6.5 Supporting Information	235
Chapter 7: Conclusions and Future Perspectives	241