

Table of Contents

1. General introduction	5
1.1 Supramolecular chemistry.	1
1.2 The chemistry of molecular recognition: molecular chemical sensors....	2
1.3 Organic-inorganic hybrid materials.	6
1.4 Organic-inorganic hybrid materials on 2D surfaces: Effect of pre-organization onto surfaces.....	8
1.5 Mesoporous materials.	10
1.5.1 Synthesis of mesoporous materials.	11
1.5.2 Functionalization of inorganic silica scaffolds: Preparation of organic-inorganic mesoporous hybrid materials.....	14
1.5.3 Characterization of mesoporous materials.	17
1.5.4 Applications of organic-inorganic mesoporous hybrid materials.	20
1.5.4.1 Molecular Gates.....	20
• pH-Driven Molecular Gates.....	22
• Light-Driven Molecular Gates	24
• Redox-Driven Molecular Gates	26
• Temperature-Driven Molecular Gates	27
• Bio (molecules)-Driven Molecular Gates.....	29
2. Optical chemosensors and reagents to detect explosives.....	33
3. Control Access to silica surfaces. An approximation to ion-channels.	139
3.1 Introduction.	141
3.2 Objectives.	146
3.3 Highly selective and sensitive chromo-fluorogenic detection of the Tetryl explosive using functional silica nanoparticles.....	147
4. Regenerable hybrid materials for the fluorometric detection of explosives	175
4.1 Introduction.	177
4.2 Objectives.	180
4.3 Organic-inorganic hybrid mesoporous materials as regenerable sensing systems for the recognition of nitroaromatic explosives	181

5. Gated materials nitroaromatic explosives probes.....	223
5.1 Introduction.	225
5.2 Objectives.	233
5.3 Fluorogenic detection of Tetryl and TNT explosives using nanoscopic- capped mesoporous hybrid materials.....	234
5.4 Tetrathiafulvalene-capped hybrid materials for the optical detection of explosives.....	267
5.5 Chromo-fluorogenic detection of nitroaromatic explosives using silica mesoporous supports gated with tetrathiafulvalene derivatives	305
6. Conclusions and perspectives	343