

Fig. 2. Synthesis of fluorinated pyrazole amide derivatives (*a*, *b*, *c*)

3. The establishment of the biological activity model of the compound and the SAR (structure and activity relationship) study by taking into account the factors of hydrophobicity, electricity, and three-dimensional structure of the inhibitor compound, and followed by the synthetic optimization of the inhibitor structure as well as activity verification.

The aim of our study is to provide useful information for further discovery of novel precursor compounds with bactericidal activities, but also a theoretical and practical basis for the preparation of new, green and environmentally friendly pesticides on a global perspective.

References

1. P. E. Russell. Outlook. Pest. Manage. (2009) 20 : 122.
2. A. Thomas [et. al.]. Plant. Dis. (2012) 96 : 979.
3. B. A. Fraaije [et.al.].Mol. Plant. Pathol. (2012) 13 : 263.
4. T. Veloukas, G. S. Karaoglanidis. Pest. Manage. Sci. (2012) 68 : 858.
5. J. Nan [et. al.]. Org. Lett. (2004) 6 : 4551.
6. C. A. Berdugo [et. al.]. Pestic. Biochem. Phys. (2012) 104 : 171.

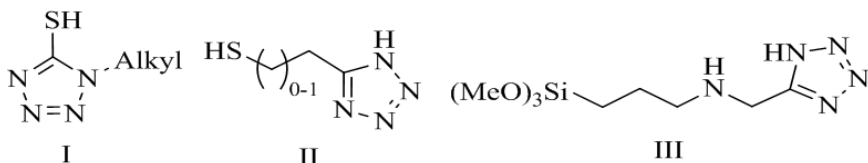
Tetrazole derivatives as capping ligands and precursors for nanostructured materials

S. V. Voitekhovich

Research Institute for Physical Chemical Problems, Belarusian State University,
Minsk, Belarus, e-mail: azole@tut.by

Tetrazole derivatives have received much attention in the recent years in the field of nanostructured materials [1]. This interest is due to the unique combination of properties of these multi-nitrogen heterocyclic compounds. First, it is the donor character peculiar to the tetrazole ring that determines the

ability of tetrazoles to form stable metal complexes as well as to stabilize colloidal nanocrystals (NCs). Second, it is a specific thermally induced fragmentation of the tetrazole ring leading to the formation of a high proportion of volatile products, mainly nitrogen. In consequence of these features, the easily available 1-alkyltetrazole-5-thiols (I) were studied as suitable capping ligands for CdS [2], Au, Ag, Pd, Pt [3] NCs. Corresponding stable NCs were prepared by solution-phase organic syntheses, including ligand exchange strategies, or by a solid-phase single-precursor approach based on the thermal decomposition of tetrazole-5-thiolates. Using tetrazoles I as ligands opens up a straightforward opportunity to obtain conductive organic-free nanocrystalline solids that have great potential in photovoltaic and catalytic applications [4].



Due to the hydrophilic nature of the heteroring, tetrazoles are of great interest in the preparation of water-soluble nanocrystals. 5-Mercaptoalkyltetrazoles (II) were found to be a good substitute for mercaptocarboxylic acids widely used as a capping agents in the aqueous synthesis of colloidal semiconductor NCs; the use of II allowed the authors of [5, 6] to prepare water soluble CdTe NCs characterized by a strong luminescence with a quantum yield of 60–77 %. NCs capped with tetrazoles II possess the unique ability to reversibly form hydrogels upon addition of metal salts. After forming the gels, the CdTe NCs preserve their absorption and photoluminescence properties, although their emission is markedly quenched. The metal-assisted gelation of tetrazole-capped NCs can also be employed to integrate different types of NCs to tune the emission of the resulting gel [7]. Such an approach has been proposed for the gelation of NCs covered by silica shells. For these purposes, silica shells were functionalized with tetrazole III, which had the ability to bind to the silica surface by a silane group [8].

Tetrazole-stabilized Au NPs immobilized on TiO₂ were found to show catalytic activity in the CO oxidation [9]. A thermal heat treatment of above Au/TiO₂ hybrid material resulted in an increased catalytic activity in comparison to the untreated samples, demonstrating the possibility to remove the tetrazole ligand from the NCs surface. This opens the possibility to use NCs stabilized with tetrazoles as long-time storable catalysts on demand which can be thermally activated under modest conditions, while preserving their catalytically active size range of several nanometers.

References

1. S. V. Voitekhovich [et al.]. *Small* (2015) 11:5728.

2. S. V. Voitekhovich [et al.]. Chem. Mater. (2008) 20:4545.
3. M. N. Nichik[et al.].J. Phys. Chem. C (2011) 115:16928.
4. J. Lauth[et al.].Adv. Funct. Mater. (2014) 24:1081.
5. V. Lesnyak[et al.]. ACS Nano (2010) 4:4090.
6. S. V. Voitekhovich [et al.]. Chem. Eur. J. (2016) 22:14746.
7. V. Lesnyak[et al.] J. Am. Chem. Soc. (2011) 133:13413.
8. C. Rengers[et al.].Nanoscale (2015) 7:12713.
9. C. Guhrenz[etal.].Z. Phys. Chem. (2017) 231:51.

Secondary metabolites from *Neosartorya fischeri*

S. L. Wang, N. B. Sun, Y. Lu, J. Yu, L. Wang, W. Ke
College of Biology and Environment Engineering, Zhejiang Shuren University,
Hangzhou 310015, P. R. China, e-mail: wangshilei1105@163.com

Neosartorya fischeri is a heat-resistant mold frequently reported to cause spoilage in fruit products [1]. It is a distinct fungal species related to *Aspergillus fumigatus*. Unlike the extensively investigated of the *Aspergillus* genus, there are few researches on the secondary metabolites of *Neosartorya* species [2–8]. From several years ago, we initiated a program of investigating the secondary metabolites of *Neosartorya fischeri*. Several secondary metabolites were isolated from the CHCl₃ extract of *Neosartorya fischeri*. The structures of the compounds were established by extensive spectroscopic methods.

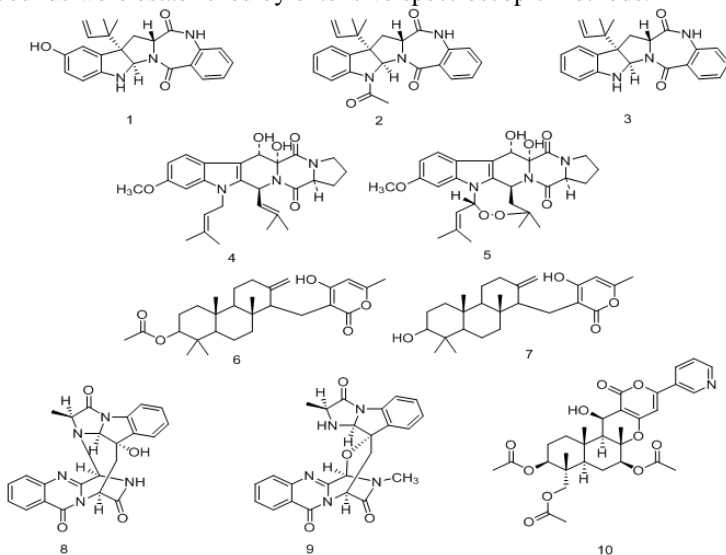


Fig. The structures of secondary metabolites obtained from *Neosartorya afischeri*