process utilized to obtain the silicon- and titanium-polysaccharide-containing hydrogels proceeds under the mild conditions at room temperature, with no catalyst or any organic solved to be used, and thus can be regarded as belonging to the green chemistry methods that show promise for biomedical materials applications.

In addition, we have developed silicon-chitosan-containing dental films, intended for the treatment of periodontitis. Dental films are today an innovative dosage form that is extremely popular and effective.

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AZAHETEROCYCLIC PUSH-PULL CHROMOPHORES: SYNTHESIS, PHOTOPHYSICAL PROPERTIES AND APPLICATIONS AS FLUORESCENT SENSORS*

Keywords: pyrimidine, pyrazine, fluorescence quenching, push-pull fluorophores.

The recently obtained data on functionalization of pyrimidine [1–9] and pyrazine [10–12] derivatives by Suzuki or transition metal-free cross-coupling reactions will be presented. Due to the significant π-deficient character of azaheterocyclic moiety, they can be used as electron-withdrawing group in push-pull structures in which intramolecular charge transfer process occurs (figure). The photophysical properties for such fluorophores have been investigated using absorption and emission spectral analyses, both in solution and in solid-state. Some dyes exhibit strong emission solvatochromism (up to 200 nm) and possess high quantum yields, depending on their molecular structure and solvent polarity. Meanwhile, fluorescence studies have shown that emission of this fluorophores is sensitive towards various nitroaromatic compounds, either in solutions or in a vapor phase.

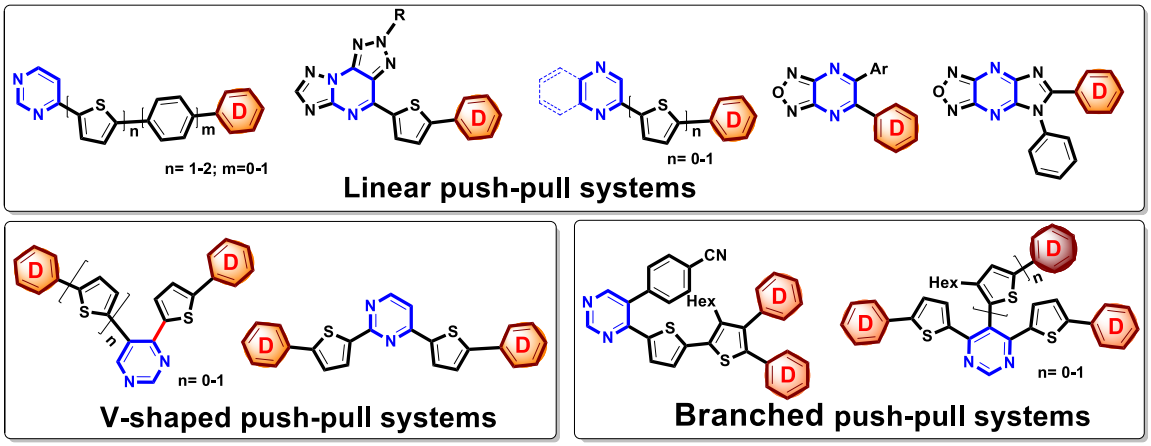

Figure. Structures of various push-pull systems based on 1,3-diazine and 1,4-diazine scaffolds

Thus, these compounds can be regarded as promising multifunctional chemosensors.

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THE PAAL-KNORR REACTION IN THE SYNTHESIS OF 1,2-ANNULATED PYRROLES*

Keywords: Furan, Paal-Knorr synthesis, 1,4-Diketone, Domino reaction.

An original effective protocol for the synthesis of 1,2-annulated pyrroles has been developed. This new process features the simultaneous formation of both pyrrole and diazepine cores as a result of intramolecular Paal-Knorr reaction of 1,4-dicarbonyl compounds forming during an acid-catalyzed hydrolysis of the corresponding furans **1**. A wide variety of pyrrolo[1,2-*a*][1,4]diazepines **3** and pyrrolo[1,2-*d*][1,4]diazepines **4**, prospective pharmacological agents, was synthesized (*path a*) [1]. In addition to this, a simple and effective methods for the synthesis of substituted (het)arene-annulated pyrrolo[1,2-*d*][1,4]diazepines **5** and pyrrolo[1,2-*a*]quinoxalines **6**. The developed approach is based on the acid-catalyzed hydrolysis of substituted furans **2** with the formation of the corresponding 1,4-diketones followed by the key reductive cyclization with the formation of a broad range of nitrogen heterocycles **5**, **6** (*path b*) [2, 3].

The optimal reaction conditions were found, the scope and limitations of the developed method were defined. Cytotoxicity of synthesized 1,2-annulated pyrroles against cell lines HEK293T, VA13, MCF7, A549 and MCF10A was investigated. Research results will be presented in the report.