

## The ISHC Bulletin

### Recent Publications of ISHC Members

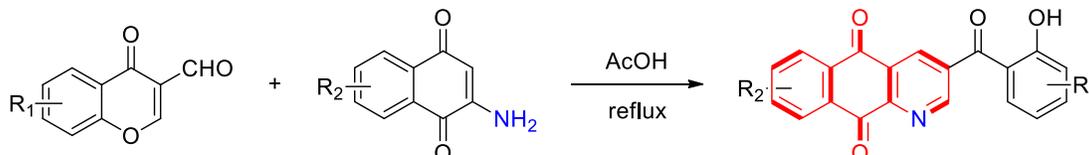
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#### One Pot and Metal-Free Approach to 3-(2-Hydroxybenzoyl)-1-aza-anthraquinones

Jiaqi Yuan, Qian He, Shanshan Song, Xiaofei Zhang,\* Zehong Miao, and Chunhao Yang\*  
([xiaofeizhang@simmm.ac.cn](mailto:xiaofeizhang@simmm.ac.cn) or [chyang@simmm.ac.cn](mailto:chyang@simmm.ac.cn))

*Molecules* **2019**, *24*, 3017 (1–12).

DOI: 10.3390/molecules24163017



- Commercially available starting materials
- Metal-free and practical reaction conditions
- 20 examples, up to 95% yield

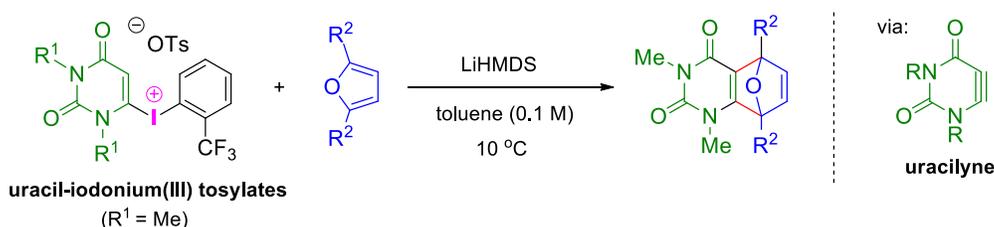
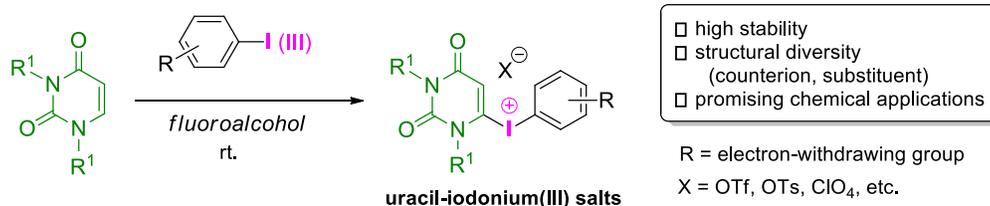
**Abstract:** Herein, a direct strategy to synthesize 3-(2-hydroxybenzoyl)-1-aza-anthraquinones with excellent efficiency, mild conditions, and benign functional group compatibility was reported. A variety of 3-formylchromone compounds were employed as compatible substrates and this protocol gave the 3-(2-hydroxybenzoyl)-1-aza-anthraquinone derivatives in good to excellent yields without inert gas and expensive transition metal catalysts. Some compounds displayed good anti-proliferative activities.

#### Synthesis of Uracil-Iodonium(III) Salts for Practical Utilization as Nucleobase Synthetic Modules

Naoko Takenaga,\* Takumi Hayashi, Shohei Ueda, Hiroyuki Satake, Yoichi Yamada, Tetsuya Kodama, and Toshifumi Dohi\* ([ntakenag@meijo-u.ac.jp](mailto:ntakenag@meijo-u.ac.jp) or [td1203@ph.ritsumei.ac.jp](mailto:td1203@ph.ritsumei.ac.jp))

*Molecules* **2019**, *24*, 3034 (1–13).

DOI: 10.3390/molecules24173034



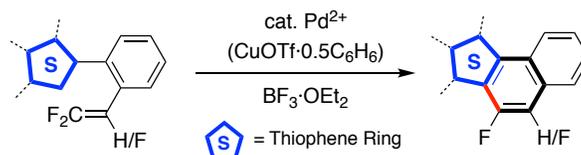
**Abstract:** Iodonium(III) salts bearing uracil moieties have recently appeared in the literature, but their structural scope and utilization are limited because of their hygroscopic characteristics. In this study, we describe our detailed investigations for synthesizing a series of uracil iodonium(III) salts derived with various structural motifs and counterions. These new compounds have been utilized as attractive synthetic modules in constructing functionalized nucleobase and nucleosides.

## Construction of Pinpoint-Fluorinated Benzothiophene Frameworks Using Palladium-Catalyzed Cyclization of *o*-(Fluorovinyl)phenyl-Substituted Thiophenes

Kohei Fuchibe, Nobushige Tsuda, Kento Shigeno, and Junji Ichikawa ([junji@chem.tsukuba.ac.jp](mailto:junji@chem.tsukuba.ac.jp))

*Heterocycles* **2019**, *99*, 1196–1216.

DOI: 10.3987/COM-18-S(F)95



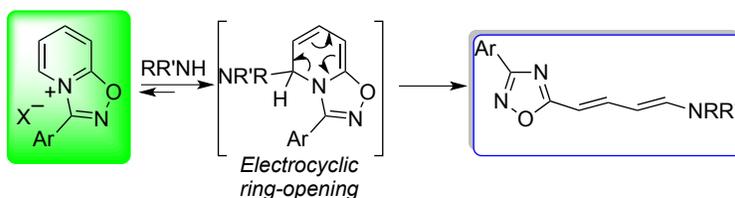
**Abstract:** *o*-(1,1-Difluorovinyl)phenyl- or *o*-(1,1,2-trifluorovinyl)phenyl-substituted thiophenes underwent palladium(II)-catalyzed Friedel–Crafts-type cyclization on the fluorovinyl moieties to construct regioselective monofluorinated or difluorinated benzothiophene frameworks (pinpoint-fluorinated naphtho[*b*]thiophenes). The cyclization of less nucleophilic 2-substituted thiophenes was effectively promoted by the addition of a CuOTf complex. Cyclization was also conducted in a tandem process, which facilitated the rapid synthesis of higher-order pinpoint-fluorinated PAHs (polycyclic aromatic hydrocarbons) bearing thiophene rings. Furthermore, cyclization was applied to the corresponding furan systems, which led to pinpoint-fluorinated naphtho[*b*]furans.

## Electrocyclic Ring-Opening of 1,2,4-Oxadiazole[4,5-*a*]pyridinium Chloride: A New Route to 1,2,4-Oxadiazole Dienamino Compounds

Stefano Carella, Misal Guiseppe Memeo,\* and Paolo Quadrelli\* ([misalgmemeo@gmail.com](mailto:misalgmemeo@gmail.com) or [paolo.quadrelli@unipv.it](mailto:paolo.quadrelli@unipv.it))

*ChemistryOpen* **2019**, *8*, 1209–1221.

DOI: 10.1002/open.201900230



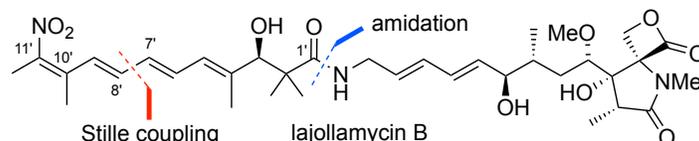
**Abstract:** 1,2,4-Oxadiazole[4,5-*a*]pyridinium chloride adds nucleophiles to undergo electrocyclic ring opening affording 1,2,4-oxadiazole dienamino derivatives. These pyridinium salts represent a special class of Zincke salts that are prone to rearrange when treated with primary amines or in the presence of bicarbonate to give the pyridones. The pivotal tuning of the experimental conditions leads to a straightforward synthesis of valuable 1,2,4-oxadiazole dienamino derivatives. The mechanism is also discussed in the light of NMR experiments and theoretical calculations.

## Total Synthesis of Lajollamycin B

Tatsuya Nishimaru, Kohei Eto, Keita Komine, Jun Ishihara,\* and Susumi Hatakeyama\* ([jishi@nagasaki-u.ac.jp](mailto:jishi@nagasaki-u.ac.jp) or [susumi@nagasaki-u.ac.jp](mailto:susumi@nagasaki-u.ac.jp))

*Chem. Eur. J.* **2019**, *25*, 7927–7934.

DOI: <https://doi.org/10.1002/chem.201901069>



**Abstract:** The first total synthesis of lajollamycin B, a structurally novel nitro-tetraene spiro- $\beta$ -lactone/ $\gamma$ -lactone antibiotic, is described. The convergent synthesis involves the construction of the C8<sup>1</sup>-C11<sup>1</sup>' nitrodienylstannane and its coupling with the segment prepared from the C1<sup>1</sup>-C7<sup>1</sup>'  $\omega$ -iodoheptadienoic acid and the right-hand heterocyclic fragment which have been utilized for our previous syntheses of oxazolomycin A. The revision of the geometry of the terminal  $\Delta^{10,11'}$ -double bond from *E* to *Z* is also described for the structure of natural lajollamycin B.

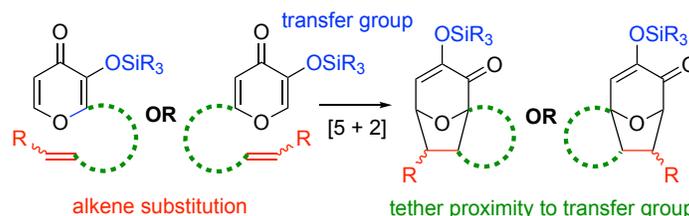
## Investigation of Transfer Group, Tether Proximity, and Alkene Substitution for Intramolecular Silyloxypyrrone-Based [5 + 2] Cycloadditions

Jacob J. Bulandr, Jacob P. Grabowski, Chunyin M. Law, Jessica L. Shaw, John R. Goodell, and T.

Andrew Mitchell\* ([mitchell@ilstu.edu](mailto:mitchell@ilstu.edu))

*J. Org. Chem.* **2019**, *84*, 10306–10320.

DOI: 10.1021/acsjoc.9b01479



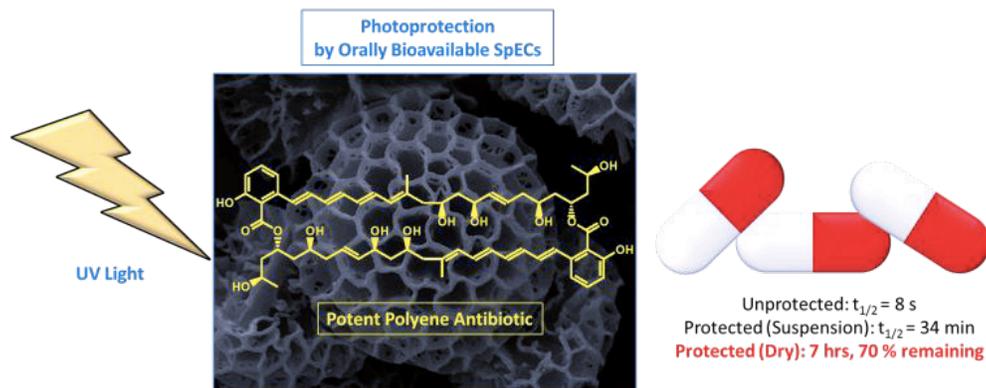
**Abstract:** Systematic investigation of intramolecular silyloxypyrrone-based [5 + 2] cycloadditions revealed three significant factors impacting conversion to cycloadduct: (1) the silyl transfer group has a substantial influence on the rate of reaction, and the robust *t*-butyldiphenylsilyl group was found to be more effective overall than the conventional *t*-butyldimethylsilyl group; (2)  $\alpha,\beta$ -unsaturated esters were generally more reactive than terminal olefins and afforded appreciable quantity of cycloadduct even at room temperature; and (3) the proximity of the tether to the silyl transfer group revealed a critical alignment trend between the pyrrone and the alkene. Taken together, these investigations provided insight regarding the steric and electronic parameters that impact the scope and limitation of these reactions.

## A Natural Solution to Photoprotection and Isolation of the Potent Polyene Antibiotic, Marinomycin A

Christopher S. Bailey, Joseph S. Zarins-Tutt, Matthias Agbo, Hong Gao, Alberto Diego-Taboada, Maoluo Gan, Refaat B. Hamed, Emily R. Abraham, Grahame Mackenzie,\* P. Andrew Evans\* and Rebecca J. M. Goss\* ([g.mackenzie@hull.ac.uk](mailto:g.mackenzie@hull.ac.uk) or [andrew.evans@chem.queensu.ca](mailto:andrew.evans@chem.queensu.ca) or [rjmg@st-andrews.ac.uk](mailto:rjmg@st-andrews.ac.uk))

*Chem. Sci.*, **2019**, *10*, 7549–7553.

DOI: 10.1039/c9sc01375j



**Abstract:** The photoprotection and isolation of marinomycin A using sporopollenin exine capsules (SpECs) derived from the spores of the plant *Lycopodium clavatum* is described. The marinomycins have a particularly short half-life in natural light, which severely impacts their potential biological utility given that they display potent antibiotic and anticancer activity. The SpEC encapsulation of the marinomycin A *dramatically* increases the half-life of the polyene macrodiolide to the direct exposure to UV radiation by several orders of magnitude, thereby making this a potentially useful strategy for other light sensitive bioactive agents. In addition, we report that the SpECs can also be used to selectively extract culture broths that contain the marinomycins, which provides a significantly higher recovery than with conventional XAD resins and provides concomitant photoprotection.