

The Writing Center

Message

Organization

Style & Mechanics

Format

Citations

Appointments online:
<http://writingcenter.mst.edu/>

Writing Science

Jeanine Bruening

Writing Center
Director

Spring 2016

A scientific report is:

Documentary

What?

How?

Results?

Persuasive

Methodology

Accuracy

Interpretation

Title & Authors

Quantitative DNA Interstrand Cross-Link Formation by Coumarin and Thymine: Structure Determination, Sequence Effect, and Fluorescence Detection

Huabing Sun, Heli Fan, and Xiaohua Peng*

Department of Chemistry and Biochemistry, University of Wisconsin-Milwaukee, 3210 North Cramer Street, Milwaukee, Wisconsin 53211, United States

TITLE

Specific, precise

Subject, emphasis

No initial *the*

No *study of, report on,*
etc.

AUTHORS

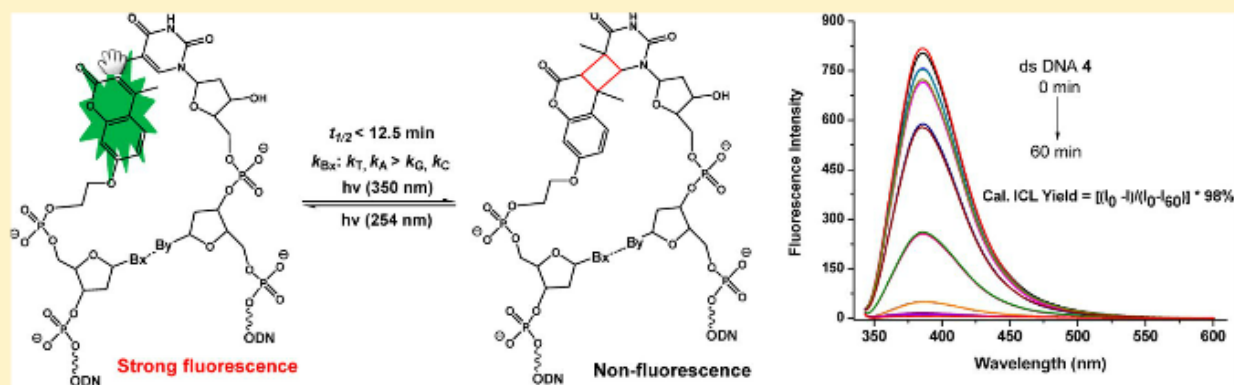
First, MI, last

No title, degrees

Corresponding author

Institutional affiliation

Abstract



ABSTRACT: The coumarin analogues have been widely utilized in medicine, biology, biochemistry, and material sciences. Here, we report a detailed study on the reactivity of coumarins toward DNA. A series of coumarin analogues were synthesized and incorporated into oligodeoxynucleotides. A photoinduced [2 + 2] cycloaddition occurs between the coumarin moiety and the thymidine upon 350 nm irradiation forming both *syn*- and *anti*-cyclobutane adducts (17 and 18), which are photoreversible by 254/350 nm irradiation in DNA. Quantitative DNA interstrand cross-link (ICL) formation was observed with the coumarin moieties containing a flexible two-carbon or longer chain. DNA cross-linking by coumarins shows a kinetic preference when flanked by an A:T base pair as opposed to a G:C pair. An efficient photoinduced electron transfer between coumarin and dG slows down ICL formation. ICL formation quenches the fluorescence of coumarin, which, for the first time, enables fast, easy, and real-time monitoring of DNA cross-linking and photoreversibility via fluorescence spectroscopy. It can be used to detect the transversion mutation between pyrimidines and purines. Overall, this work provides new insights into the biochemical properties and possible toxicity of coumarins. A quantitative, fluorescence-detectable, and photoswitchable DNA cross-linking reaction of the coumarin moieties can potentially serve as mechanistic probes and tools for bioresearch without disrupting native biological environment.

Introduction

Problem/Question

Motive/Rationale

Scope/Parameters

Pertinent Background

Results & Discussion

Interpretation, *NOT* summary

Outcomes

Contributions

Further research

Experimental

Materials

Apparatus & instrumentation

Procedure

Hazards & precautionary handling

Conclusions

Optional

No repetition

Suggestions for further research

Tables, Figures, Schemes

Descriptive title

Self-explanatory

Legend

Reference in text

Table 3. Rate of ICL Formation or Cleavage of ds DNA-10, 12, and 13

entry	k (ICL Formation, 10^{-3} s^{-1})	$t_{1/2}$ (min)	k_c (Cleavage, 10^{-2} s^{-1})	$t_{1/2}$ (min)
ds DNA-10	3.99 ± 0.32	2.91 ± 0.23	0.57 ± 0.04	2.02 ± 0.13
ds DNA-12	6.27 ± 0.62	1.86 ± 0.18	1.67 ± 0.19	0.70 ± 0.08
ds DNA-13	1.55 ± 0.14	7.51 ± 0.66	1.42 ± 0.03	0.82 ± 0.02

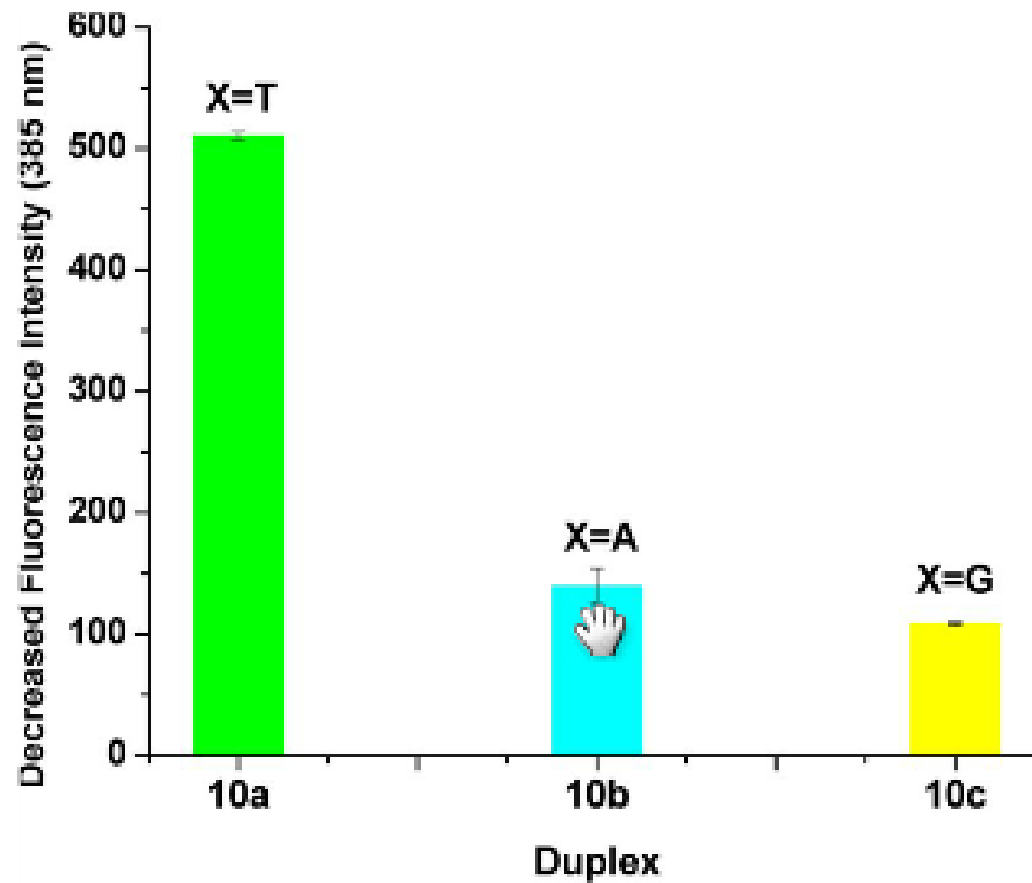
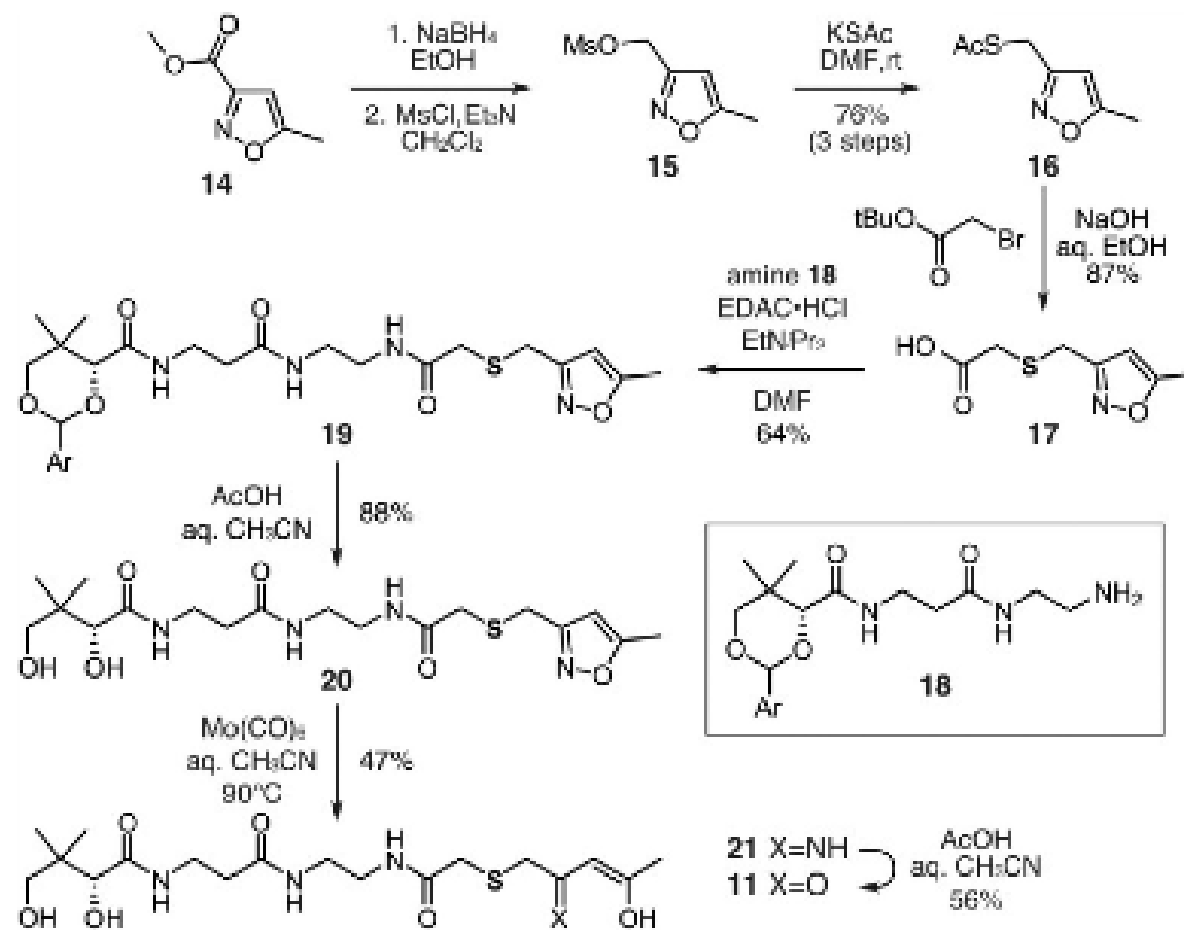


Figure 7. Decreased fluorescence intensity at 385 nm after UV irradiation at 350 nm for 1 h with 10 μ M ds DNA-11a–c (λ_{ex} = 325 nm, slit width = 6 nm; λ_{em} = 385 nm, slit width = 14 nm).

Scheme 1. Synthesis of Tetraketide Mimetic 11^a



^aAr = 4-methoxybenzyl.

Acknowledgments

Your T.A.

Writing Center Tutor

Anyone else who provided help specific to the research and writing

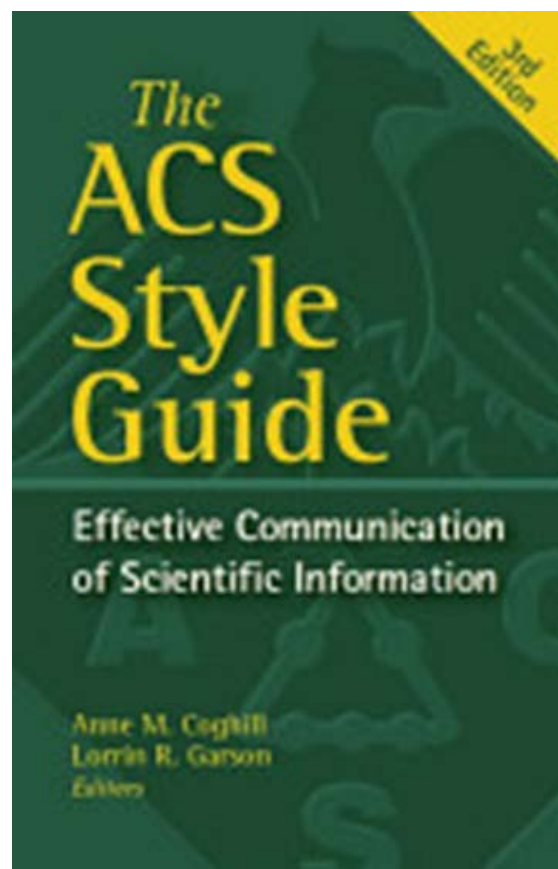
NOT:

- your family
- Your significant other
- All your best friends from high school and FB

References

See *ACS Style Guide*, Chapter 14

<http://www.cas.org/expertise/cascontent/caplus/corejournals.html>



Oxidation reactions, which involve free radicals and other reactive species, are important in human physiology and food industry.^{1,2} However, environmental and behavioral stressors (e.g., pollution, sunlight exposure, cigarette smoking, and excessive alcohol consumption) produce excess free radicals that result in oxidative stress. Oxidative-stress products directly damage biomolecules or initiate chain reactions that cause extensive damage to cellular structures. Antioxidants protect biological and food systems from the harmful effects of oxidative stress.³ The mechanism by which antioxidants achieve their functions include reacting with free radicals, chelating catalytic metals, and scavenging reactive oxygen species.⁴ As such, analytical methods for the antioxidant capacity assay of various molecules have received significant research interest.

Several assays based on electrochemical, fluorescence, chemiluminescence, and spectrophotometric detection have been used to measure the antioxidant capacities of antioxidants.⁵⁻⁷ Among these methods, colorimetric assays have attracted considerable attention because they require simple instrumentation (e.g., UV-vis spectrophotometer) and simple screening analysis (e.g., by the naked eye). Several colorimetric methods for antioxidant capacity assay have been developed.⁸⁻²¹ The most widely used colorimetric method is the ABTS-based Trolox equivalent antioxidant capacity (TEAC) assay.^{12,13} This method was previously suggested as a standardized method for determining antioxidant capacity.⁶

■ REFERENCES

- (1) Nyska, A.; Kohen, R. *Toxicol. Pathol.* **2002**, *30*, 620–650.
- (2) Brannan, R. G.; Connolly, B. J.; Decker, E. A. *Trends Food Sci. Technol.* **2001**, *12*, 164–173.
- (3) Giasson, B. L.; Ischiropoulos, H.; Lee, V. M. Y.; Trojanowski, J. Q. *Free Radical Biol. Med.* **2002**, *32*, 1264–1275.
- (4) Sánchez-Moreno, C.; A. Larrauri, J.; Saura-Calixto, F. *Food Res. Int.* **1999**, *32*, 407–412.
- (5) Ozyurek, M.; Gungor, N.; Baki, S.; Guclu, K.; Apak, R. *Anal. Chem.* **2012**, *84*, 8052–8059.
- (6) Prior, R. L.; Wu, X. L.; Schaich, K. *J. Agric. Food Chem.* **2005**, *53*, 4290–4302.
- (7) Barroso, M. F.; de-los-Santos-Álvarez, N.; Lobo-Castañón, M. J.; Miranda-Ordieres, A. J.; Delerue-Matos, C.; Oliveira, M. B.; Tuñón-Blanco, P. *Biosens. Bioelectron.* **2011**, *26*, 2396–2401.
- (8) Brand-Williams, W.; Cuvelier, M. E.; Berset, C. *Lebensm.-Wiss. Technol.* **1995**, *28*, 25–30.
- (9) Fogliano, V.; Verde, V.; Randazzo, G.; Ritieni, A. *J. Agric. Food Chem.* **1999**, *47*, 1035–1040.
- (10) Benzie, I. F. F.; Strain, J. J. *Anal. Biochem.* **1996**, *239*, 70–76.
- (11) Ghishelli, A.; Nardini, M.; Baldi, A.; Scaccini, C. *J. Agric. Food Chem.* **1998**, *46*, 361–367.

Supporting Information

In general:

Large tables

Extensive figures

Lengthy procedures

For this paper:

Your “yellow pages”

IR & NMR charts

Table of properties

Table of products and yields

Style

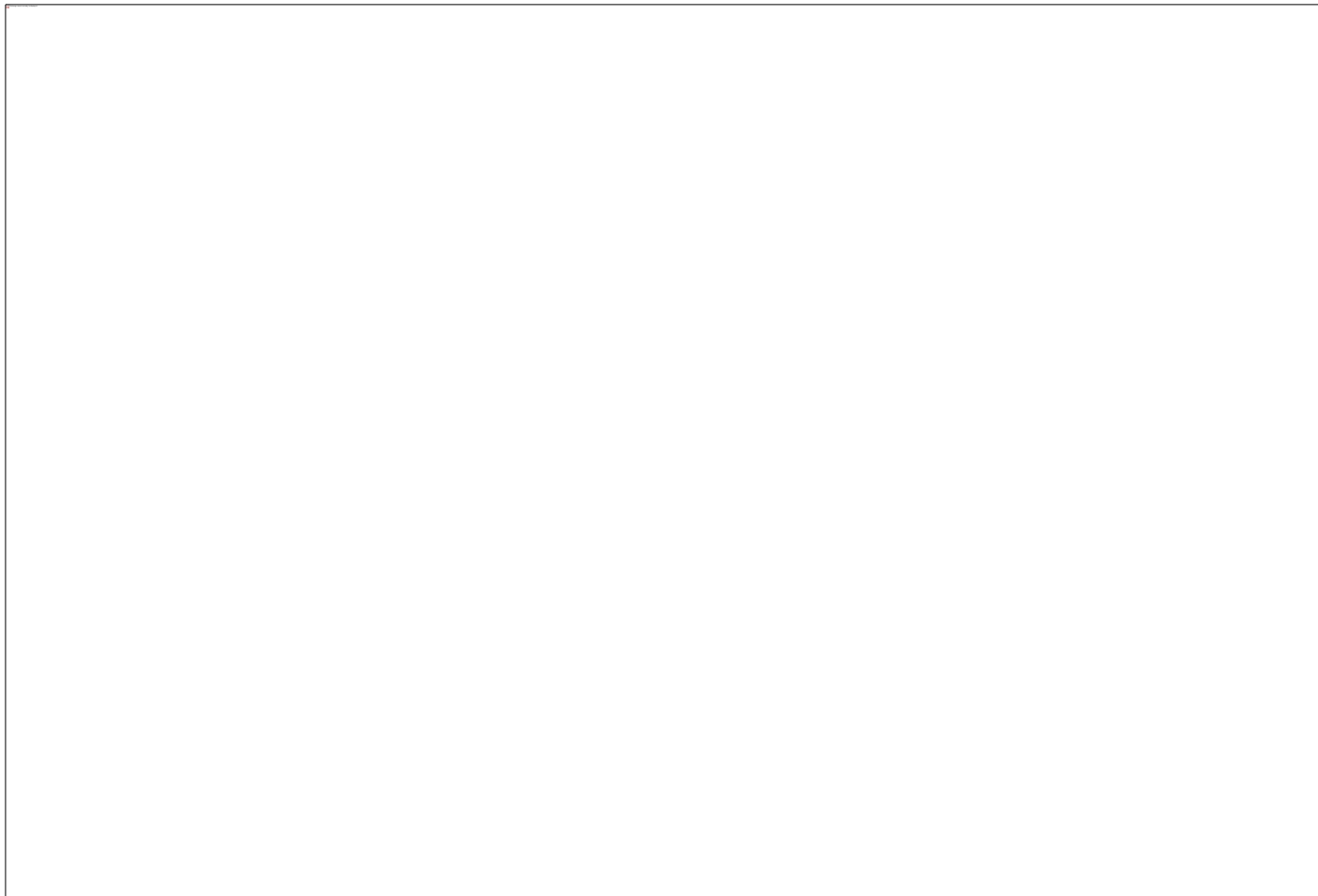
Telling the Story

Clarity & Simplicity

Epigenetic events contribute to the etiology of diabetes;

however, the lack of epigenomic analysis has limited the
Elucidation of the mechanistic basis for this link.

Concise Vocabulary



Active Voice

Awkward: *Study design criteria are shown in Table 3.*

Better: *Table 3 shows the study design criteria.*

Awkward: *It has been shown that neither epidemic was characterized by environmental variation.*

Better: *The data indicate no environmental variation associated with either epidemic.*

Indirect Language

It is indicated that...

It is implied that...

It was expected that...

It will be argued that...

In this paper, it...

In this article, it...

In this analysis, it...

Example #1

Awkward:

It is observed that processing time decreases with higher values of x .

Better:

Processing time decreases with higher values of x .

Example #2

Awkward:

In this article, it is suggested that the WAPK approach can overcome these limitations.

Better:

Mason et al. suggest that the WAPK approach can overcome these limitations.

Perspective

Compare:

We sampled the ions from the plasma by....

The ions from the plasma were sampled by....

Ion sampling from the plasma was achieved by....

But:

We believe these results demonstrate....

Here we can see that....

We feel that this process encourages....

Verb Tense

Past Tense

Description of previous research

Methodology

Procedures

Present Tense

General facts, truths

Implications, conclusions

Example #1

Much research has focused on this problem. Smith et al. surveyed the data and concluded that the original test was invalid.

Example #2

This approach was applied in a second scenario. Figure 2.17 illustrates the process.

Acronyms & Abbreviations

Only as necessary!

On first use:

- Write out full phrase
- Indicate abbreviation in parentheses

Examples:

- Chemical Abstracts Service Source Index (CASSI)
- American Chemical Society (ACS)
- *Bacillus subtilis* (*B. subtilis*)

Some rules to remember:

- Don't start sentences with abbreviations that include periods.
- Don't treat symbols for chemical elements as abbreviations.
- Abbreviate units of measure when preceded by a number (i.e., $9 \cdot \text{v}^{-1}$); otherwise, spell them out (i.e., measured in volts per second).

A Helpful Resource

Duke University's graduate school:

<https://cgi.duke.edu/web/sciwriting/index.php>