

*Methods in Enzymology*

*Volume 291*

*Caged Compounds*

EDITED BY

*Gerard Marriott*

MAX PLANCK INSTITUTE FOR BIOCHEMISTRY  
MARTINSRIED, GERMANY



ACADEMIC PRESS

San Diego London Boston New York Sydney Tokyo Toronto

## Table of Contents

CONTRIBUTORS TO VOLUME 291 . . . . .	ix
PREFACE . . . . .	xiii
VOLUMES IN SERIES . . . . .	xv
FREDRIC STEWART FAY, H. MAURICE GOODMAN, AND DAVID WARSHAW . . . . .	xxxiii

1. New Photoprotecting Groups: Desyl and <i>p</i> -Hydroxyphenacyl Phosphate and Carboxylate Esters	RICHARD S. GIVENS, JÖRG F. W. WEBER, ANDREAS H. JUNG, AND CHAN-HO PARK	1
2. Synthesis, Photochemistry, and Biological Characterization of Photolabile Protecting Groups for Carboxylic Acids and Neurotransmitters	KYLE R. GEE, BARRY K. CARPENTER, AND GEORGE P. HESS	30
3. New Caged Groups: 7-Substituted Coumarinylmethyl Phosphate Esters	TOSHIAKI FURUTA AND MICHIKO IWAMURA	50
4. Caged Fluorescent Probes	T. J. MITCHISON, K. E. SAWIN, J. A. THERIOT, K. GEE, AND A. MALLAVARAPU	63
5. Biologically Active Peptides Caged on Tyrosine	R. SREEKUMAR, MITSUO IKEBE, FREDRIC S. FAY, AND JEFFERY W. WALKER	78
6. Light-Directed Activation of Protein Activity from Caged Protein Conjugates	GERARD MARRIOTT, JOHANNES OTTL, MANFRED HEIDECKER, AND DANIELA GABRIEL	95
7. Caged Peptides and Proteins by Targeted Chemical Modification	HAGAN BAYLEY, CHUNG-YU CHANG, W. TODD MILLER, BRETT NIBLACK, AND PENG PAN	117
8. Photocleavable Affinity Tags for Isolation and Detection of Biomolecules	JERZY OLEJNIK, EDYTA KRZYMAŃSKA- OLEJNIK, AND KENNETH J. ROTHSCHILD	135

9. Synthesis and Applications of Heterobifunctional Photocleavable Cross-Linking Reagents	GERARD MARRIOTT AND JOHANNES OTTL	155
10. Use of Lasers for One- and Two-Photon Photolysis of Caged Compounds	JAMES A. MCCRAY	175
11. Flash Lamp-Based Irradiation of Caged Compounds	GERT RAPP	202
12. Fourier Transform Infrared Photolysis Studies of Caged Compounds	VALENTIN CEPUS, CAROLA ULBRICH, CHRISTOPH ALLIN, AGNES TROULLIER, AND KLAUS GERWERT	223
13. Use of Caged Compounds in Studies of Bioelectronic Imaging and Pattern Recognition	C. W. WHARTON AND R. S. CHITTOCK	245
14. Use of Caged Nucleotides to Characterize Unstable Intermediates by X-Ray Crystallography	AXEL SCHEIDIG, CHRISTOPH BURMESTER, AND ROGER S. GOODY	251
15. Photoregulation of Cholinesterase Activities with Caged Cholinergic Ligands	LING PENG AND MAURICE GOELDNER	265
16. Caged Substrates for Measuring Enzymatic Activity <i>in Vivo</i> : Photoactivated Caged Glucose 6-Phosphate	ROBERT R. SWEZEY AND DAVID EPEL	278
17. Investigation of Charge Translocation by Ion Pumps and Carriers Using Caged Substrates	K. FENDLER, K. HARTUNG, G. NAGEL, AND E. BAMBERG	289
18. Studies of Molecular Motors Using Caged Compounds	JODY A. DANTZIG, HIDEO HIGUCHI, AND YALE E. GOLDMAN	307
19. Application of Caged Fluorescein-Labeled Tubulin to Studies of Microtubule Dynamics and Transport of Tubulin Molecules in Axons	TAKESHI FUNAKOSHI AND NOBUTAKA HIROKAWA	348
20. Two-Photon Activation of Caged Calcium with Submicron, Submillisecond Resolution	EDWARD B. BROWN AND WATT W. WEBB	356
21. Caged Inositol 1,4,5-Trisphosphate for Studying Release of $Ca^{2+}$ from Intracellular Stores	NICK CALLAMARAS AND IAN PARKER	380
22. Characterization and Application of Photogeneration of Calcium Mobilizers cADP-Ribose and Nicotinic Acid Adenine Dinucleotide Phosphate from Caged Analogs	KYLE R. GEE AND HON CHEUNG LEE	403

23. Applications of Caged Compounds of Hydrolysis-Resistant Analogs of cAMP and cGMP	U. BENJAMIN KAUPP, CLAUDIA DZEJA, STEPHAN FRINGS, JÜRGEN BENDIG, AND VOLKER HAGEN	415
24. Caged Probes for Studying Cellular Physiology: Application of <i>o</i> -Nitromandelyloxycarbonyl (Nmoc) Caging Method to Glutamate and a Ca <sup>2+</sup> -ATPase Inhibitor	FRANCIS M. ROSSI, MICHAEL MARGULIS, ROBERT E. HOESCH, CHA-MIN TANG, AND JOSEPH P. Y. KAO	431
25. Development and Application of Caged Ligands for Neurotransmitter Receptors in Transient Kinetic and Neuronal Circuit Mapping Studies	GEORGE P. HESS AND CHRISTOF GREWER	443
26. Caged Plant Growth Regulators	ANDREW C. ALLAN, JANE L. WARD, MICHAEL H. BEALE, AND ANTHONY J. TREWAVAS	474
27. Use of Caged Compounds in Studies of the Kinetics of DNA Repair	R. A. MELDRUM, R. S. CHITTOCK, AND C. W. WHARTON	483
AUTHOR INDEX . . . . .		497
SUBJECT INDEX . . . . .		515