

Contents

Preface — V

Contributing authors — IX

Markus Antonietti, Oleksandr Savateev and Bettina V. Lotsch

Chapter 1

Celebrating 200 years of carbon nitride — 1

Oleksandr Savateev and Bettina V. Lotsch

Chapter 2

Classification, synthesis and structure of carbon nitrides — 5

Yuanxing Fang and Xinchun Wang

Chapter 3

Photocatalytic water splitting by carbon nitride polymers — 37

Han Li and Shaowen Cao

Chapter 4

CO₂ fixation and transformation technology with carbon nitride — 73

Qi Xiao and Jingsan Xu

Chapter 5

Carbon nitride as noninnocent catalyst support — 107

Ivo Freitas Teixeira and Gabriel Ali Atta Diab

Chapter 6

Carbon nitride-based materials: the ultimate support for single-atom catalysis — 123

Xiu Lin, Shi-Nan Zhang, Dong Xu, Lu-Han Sun, Guang-Yao Zhai,

Peng Gao and Xin-Hao Li

Chapter 7

Carbon nitride for heterojunction catalysis — 147

Oleksandr Savateev and Stefano Mazzanti

Chapter 8

Carbon nitride organic photocatalysis — 177

Filip Podjaski, Vincent W.-h. Lau and Bettina V. Lotsch

Chapter 9

Photocharging carbon nitrides: from fundamental properties to applications combining solar energy conversion and storage — 231

Nobuhiko Mitoma and Takuzo Aida

Chapter 10

Graphitic carbon nitride thin films: synthesis, properties, actuators and electronic devices — 271

Yuanyuan Zhang and Jian Liu

Chapter 11

Thin-film carbon nitride active layers for catalysis, sensing and solar cells — 291

Paolo Giusto

Chapter 12

Carbon nitride thin films as a high refractive index optical material — 321

Kai Xiao and Lei Jiang

Chapter 13

Carbon nitride-based artificial light-driven ion pumps — 345

Markus Antonietti, Oleksandr Savateev and Xinchun Wang

Chapter 14

Looking into the crystal ball of a sustainable future chemistry with carbon nitride — 367

Index — 373