



### Springer books available as

 Printed book

Available from [springer.com/shop](http://springer.com/shop)

 eBook

Available from your library or

► [springer.com/shop](http://springer.com/shop)

 MyCopy

Printed eBook for just

► € | \$ 24.99

► [springer.com/mycopy](http://springer.com/mycopy)

## **Biofuels and Biorefineries**

Series Ed.: Z. Fang

Annual global biomass production is about 220 billion dry tons or 4,500 EJ, equivalent to 8.3 times the world's energy consumption in 2014 (543 EJ). On the other hand, world-proven oil reserves at the end of 2011 reached 1652.6 billion barrels, which can only meet 54.2 years of global production. Therefore, alternative resources are needed to both supplement and replace fossil oils as the raw material for transportation fuels, chemicals and materials in petroleum-based industries. Renewable biomass is a likely candidate, because it is prevalent over the Earth and is readily converted to other products. Compared with coal, some of the advantages of biomass are: (i) its carbon-neutral and sustainable nature when properly managed; (ii) its reactivity in biological conversion processes; (iii) its potential to produce bio-oil (ca. yields of 75%) by fast pyrolysis because of its high oxygen content; (iv) its low sulphur and lack of undesirable contaminants (e.g. metals, nitrogen content) (v) its wide geographical distribution and (vi) its potential for creating jobs and industries in energy crop productions and conversion plants. Many researchers, governments, research institutions and industries are developing projects for converting biomass including forest woody and herbaceous biomass into chemicals, biofuels and materials and the race is on for creating new "biorefinery" processes needed for future economies. The development of biorefineries will create remarkable opportunities for the forestry sector, biotechnology, materials, chemical processing industry, and stimulate advances in agriculture. It will help to create a sustainable society and industries that use renewable and carbon-neutral resources.

### **Recently published:**

Z. Fang, R.L. Smith, L. Xu (Eds.)

#### **Production of Biofuels and Chemicals with Pyrolysis**

Vol. 10

Z. Fang, R.L. Smith, X. Tian (Eds.)

#### **Production of Materials from Sustainable Biomass Resources**

Vol. 9

Z. Fang, R.L. Smith Jr., H. Li (Eds.)

#### **Production of Biofuels and Chemicals with Bifunctional Catalysts**

Vol. 8

### **Upcoming Volumes:**

Z. Fang, R.L. Smith, L. Xu (Eds.)

#### **Production of Biofuels and Chemicals from Sustainable Recycling of Organic Solid Waste**

Vol. 11



**Submission information at the [series homepage](http://serieshomepage) and [springer.com/authors](http://springer.com/authors)**

Order online at [springer.com](http://springer.com) ► or for the Americas call (toll free) 1-800-SPRINGER ► or email us at: [customerservice@springer.com](mailto:customerservice@springer.com). ► For outside the Americas call +49 (0) 6221-345-4301 ► or email us at: [customerservice@springer.com](mailto:customerservice@springer.com).