

能源和环境工程

## 高速热解条件下谷壳颗粒物理结构的演化

胡松, 孙路石, 向军, 邱建荣, 徐明厚

华中科技大学煤燃烧国家重点实验室

收稿日期 2006-12-7 修回日期 2007-3-9 网络版发布日期 2007-11-7 接受日期

摘要

通过氮气等温吸附/脱附法(-196℃)、压汞法(414 MPa)、SEM等详细研究了在高速热解条件下谷壳的物理结构的演化。在热解的不同阶段, 颗粒外表面特征明显不同。通过SEM测定发现, 在热解中期颗粒表面孔结构明显增多, 同时可以清晰地看到孔隙内表面粗糙且非规则结构。利用等温吸附/脱附法测定在高速热解过程中颗粒内微孔(micropore)演化特征, 发现当热解反应率 $R_p$ 等于0.8时, 微孔增加速率最大。由压汞法测定得到的大孔(macropore)演化规律与微孔不太一致, 在反应初期颗粒会发生强烈收缩现象, 真密度增加很快, 随着反应进行, 颗粒的真密度基本保持恒定。

关键词 [谷壳](#) [吸附/脱附](#) [压汞法](#)

分类号

## Physical structure evolution of rice husk particles during high speed pyrolysis

HU Song,SUN Lushi,XIANG Jun,QIU Jianrong,XU Minghou

### Abstract

The changes in physical characteristics of rice husk during high speed pyrolysis were examined. The pyrolysis reaction ratios (defined as the ratio of pyrolyzed mass to pyrolyzable mass) of rice husk particles prepared under different conditions were calculated by non-isothermal thermogravimetric analysis. To study the physical characteristics of rice husk/char particles, proximate and ultimate analyses, physical adsorption/desorption measurements of  $N_2$ (-196℃), mercury injection porosimetry (414 MPa) as well as visualization by scanning electronic microscopy(SEM) were performed. Appreciable differences in physical characteristics, depending markedly on the pyrolysis stage, were observed. Rough pore surface in char particles was detected clearly by SEM measurement. The release of volatile matter led to the development of pores with different sizes. Progressive increase of micropores developed with the pyrolysis process, whereas a maximum speed of micropore development occurred at the pyrolysis reaction ratio of 0.8. But macropores in char particles had different evolution characteristics. Based on the analysis result of density and porosity data, the particles shrank greatly at the first stage of high speed pyrolysis.

### Key words

[rice husk](#) [adsorption/desorption](#) [mercury injection porosimetry](#)

DOI:

通讯作者 胡松 [hssh30@163.com](mailto:hssh30@163.com)

### 扩展功能

#### 本文信息

- ▶ [Supporting info](#)
- ▶ [PDF\(1087KB\)](#)
- ▶ [\[HTML全文\]\(0KB\)](#)
- ▶ [参考文献](#)

#### 服务与反馈

- ▶ [把本文推荐给朋友](#)
- ▶ [加入我的书架](#)
- ▶ [加入引用管理器](#)
- ▶ [复制索引](#)
- ▶ [Email Alert](#)
- ▶ [文章反馈](#)
- ▶ [浏览反馈信息](#)

#### 相关信息

- ▶ [本刊中 包含“谷壳”的 相关文章](#)
- ▶ 本文作者相关文章

- [胡松](#)
- [孙路石](#)
- [向军](#)
- [邱建荣](#)
- [徐明厚](#)