TiO_2纳米粒子气固相光催化降解乙烯初探

Application of gas-solid heterogeneous photocatalytic reaction of nanoparticle TiO_2 to ethylene degradation

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中文摘要：

该文对TiO_2纳米粒子气固光催化降解果蔬贮藏环境乙烯技术进行了初步研究。采用溶胶-凝胶法制备的纳米TiO_2薄膜作光催化剂，利用自行设计的气固光催化实验系统，研究了乙烯浓度、紫外光作用时间对光催化降解反应的影响，探讨了乙烯的光催化降解的动力学。结果显示：该研究所制备的TiO_2锐钛矿型含量为48.766%，比表面积为47.186 m^2/g，具有良好的光催化性能；光催化降解乙烯比直接紫外线光降解效果显著，光照10 min时光催化乙烯降解率比直接紫外线光降解提高23.76%；乙烯的降解率随着其浓度的增加而降低；乙烯的光催化降解的动力学可以用Langmuir-Hinshelwood动力学方程加以描述。

英文摘要：

A gas-solid heterogeneous photocatalytic reaction of TiO_2 was investigated for ethylene degradation during storage of fruit and vegetable. Photocatalysis of ethylene degradation by nanoparticle TiO_2 which was prepared by sol-gel processing was conducted in gas-solid phase photocatalytic experiment system. The effects of ethylene concentration and illumination time of UV light on degradation reaction, the kinetics of photocatalysis of ethylene degradation were also studied. The results showed that: the content of anatase phase of the TiO_2 catalyst was 48.766%, and its specific surface area was 47.186 m^2/g, the TiO_2 catalyst is of good photocatalytic activity; under 10 min illumination of UV light, the degradation rate of ethylene in TiO_2 photocatalytic treatment was increased by about 23.76%, compared with that of the UV light without TiO_2 treatment; the degradation rate of ethylene decreased with the increase of ethylene concentrations; the kinetics of gas-solid heterogeneous photocatalytic reaction of nanoparticle TiO_2 for ethylene degradation can be described using the Langmuir-Hinshelwood kinetic equation.

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