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# Facile preparation of TiO<sub>2</sub>/ZnO composite aerogel with excellent antibacterial activities

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## Abstract

TiO<sub>2</sub>/ZnO composite aerogel is synthesized using Zn(NO<sub>3</sub>)<sub>2</sub>·H<sub>2</sub>O and titanium butoxide as precursors through sol-gel route combined with C<sub>2</sub>H<sub>5</sub>OH superfluid drying technique. The effects of the Zn<sup>2+</sup>/Ti<sup>4+</sup> molar ratios and concentration on the antibacterial properties of TiO<sub>2</sub>/ZnO composite aerogels are investigated. The results show that the specific surface area is as high as 180 m<sup>2</sup>/g for the samples with the Zn<sup>2+</sup>/Ti<sup>4+</sup> molar ratios of 1.5. The composite aerogels have the maximum inhibition zone of 23 mm and 19.5 mm for *E. coli* and *S. aureus*, and the minimum inhibitory concentration for *E. coli* and *S. aureus* of 100 ppm.

Keywords: TiO<sub>2</sub>; Nanocomposites; Composite materials; Sol-gel preparation; Antibacterial

## 1. Introduction

TiO<sub>2</sub> aerogels are novel antibacterial agent with excellent physicochemical stability, high specific area, high oxidation activity and non-toxic [1]. They have drawn great interests in a wide range of application prospects in antibacterial materials field [2]. However, the electrons can only be excited by absorbing ultraviolet light due to the band gap of TiO<sub>2</sub> is high (3.2 eV), which limits its wide range of application in photocatalysis and antibacterial [3, 4]. Thus, how to improve the antibacterial performance of TiO<sub>2</sub> have caused extensive concerns all over the world. Nano-ZnO is novel inorganic nanomaterials with excellent chemical stability, thermal stability and

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