



Title	Characterization and antibacterial assessments of Ag nanoclusters/rose bengal nanocomposite for antimicrobial photodynamic therapy [an abstract of entire text]
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## 学位論文内容の要約

### 学位論文題目

Characterization and antibacterial assessments of  
Ag nanoclusters / rose bengal nanocomposite for  
antimicrobial photodynamic therapy

(抗菌的光線力学療法に向けた銀ナノクラスター/  
ローズベンガル複合体の特性並びに抗菌性評価)

博士の専攻分野名称

博士 (歯学)

氏名 部 佳奈子

Ag nanoclusters (AgNCs) / rose bengal (RB) nanocomposite (AgNCs/RB) as a novel photosensitizer was created for antibacterial photodynamic therapy (a-PDT). We proposed double antibacterial effects of photoexcited AgNCs/RB; (1) singlet oxygen ( $^1\text{O}_2$ ) generated by irradiated RB and (2)  $\text{Ag}^+$  ion released by AgNCs oxidized by  $^1\text{O}_2$ . In present study, inactivation of oral bacterial cells with photoexcited AgNCs/RB were evaluated. In addition, the biosafe assessments of AgNCs/RB was carried out.

$^1\text{O}_2$  generation, zeta potential and  $\text{Ag}^+$  release of synthesized AgNCs/RB was characterized. Subsequently, the antimicrobial effect of AgNCs/RB irradiated by white light-emitting diode (LED) was evaluated using oral bacterial cells; *Streptococcus mutans*, *Porphyromonas gingivalis* and *Aggregatibacter actinomycetemcomitans*. The cytotoxicity of AgNCs/RB was investigated on NIH3T3 mammalian cells.

The binding of AgNCs and RB,  $^1\text{O}_2$  generation and  $\text{Ag}^+$  ion release of photoexcited AgNCs/RB were estimated. AgNCs/RB irradiated by white LED (60 sec) showed significantly inhibited the growth of oral bacteria when compared to AgNCs or RB. In addition, photoexcited AgNCs/RB did not negatively affect the adhesion, spreading and proliferation of mammalian cells, even at concentrations that showed antibacterial activity.

In conclusion, AgNCs/RB irradiated by white LED showed great antimicrobial effects via  $^1\text{O}_2$  generation and  $\text{Ag}^+$  ion releasing and low cytotoxic properties to be provided for dental a-PDT.