

Antimicrobial Activity of UV-induced Gelatin Edible Films against *Staphylococcus aureus*

紫外線交聯明膠之可食性膜對金黃色葡萄球菌之抑菌評估

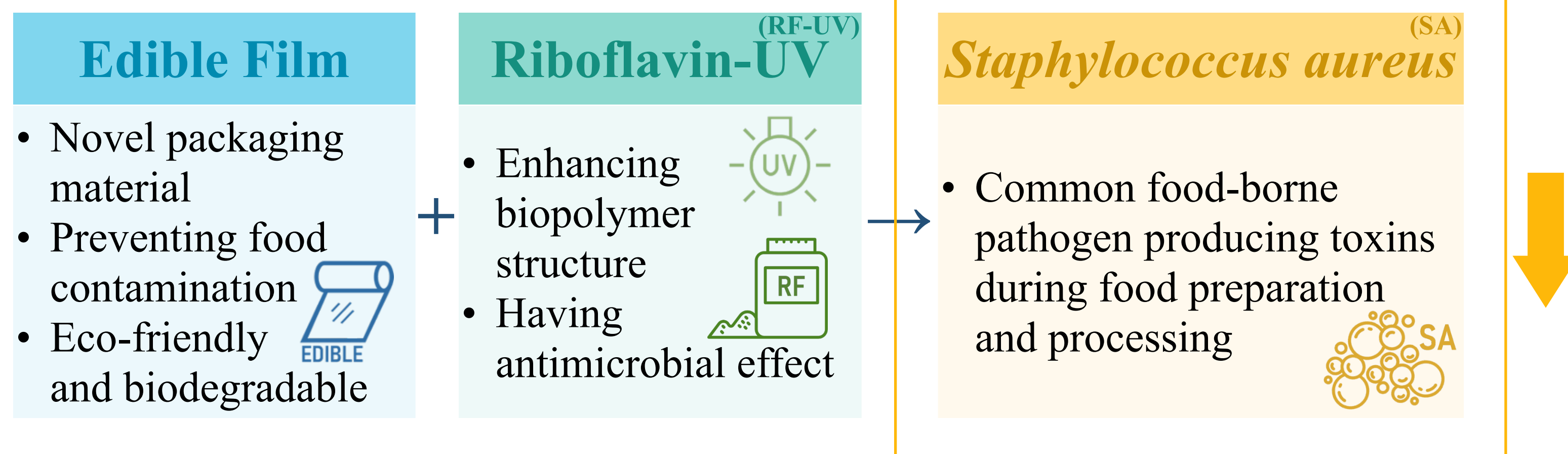
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01. Introduction



02. Study Objective

- To investigate the antimicrobial activity of UV-induced gelatin edible films against *Staphylococcus aureus*
- To compare the possible factors affecting the antimicrobial efficacy

03. Materials and Methods

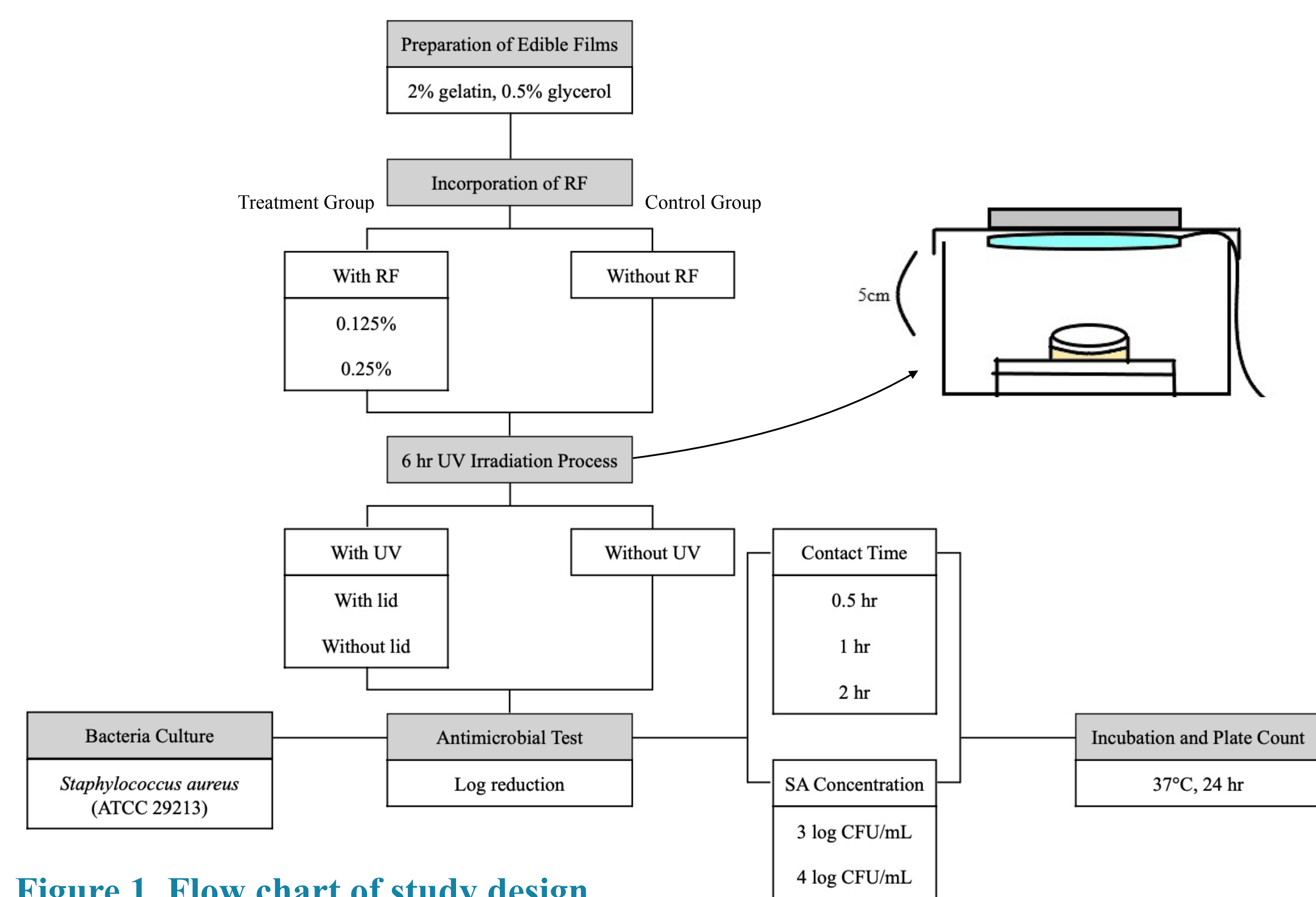


Figure 1. Flow chart of study design

Table 1. Formulation of film forming solutions

Abbreviation	Formulae
Control	2% gelatin + 0.5% glycerol, no UV exposure
RF-UV 1	2% gelatin + 0.5% glycerol + 0.025% riboflavin, 6 hr UV exposure, without lid
RF-UV 2	2% gelatin + 0.5% glycerol + 0.025% riboflavin, 6 hr UV exposure, with lid
RF-UV 3	2% gelatin + 0.5% glycerol + 0.0125% riboflavin, 6 hr UV exposure, without lid

• **Bacterial concentration (CFU/mL)** = $\frac{N \times D}{V}$

Where: N is the number of colonies counted (CFU),
 D is the dilution factor,
 V is the volume of inoculum (mL)

• **Log reduction** = $\log_{10} \left(\frac{C_C}{C_T} \right) = \log_{10} (C_C) - \log_{10} (C_T)$

Where: C_C is the bacterial concentration of the control group (CFU/mL),
 C_T is the bacterial concentration of the treatment group (CFU/mL)

04. Results

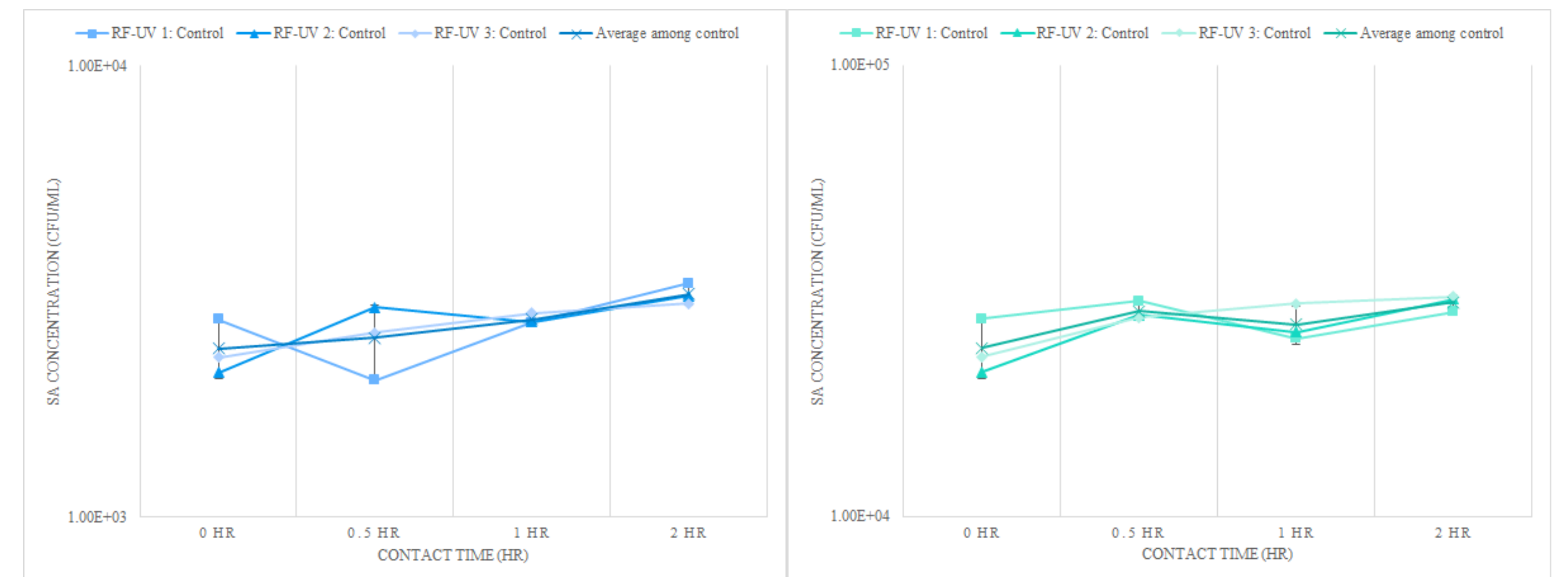
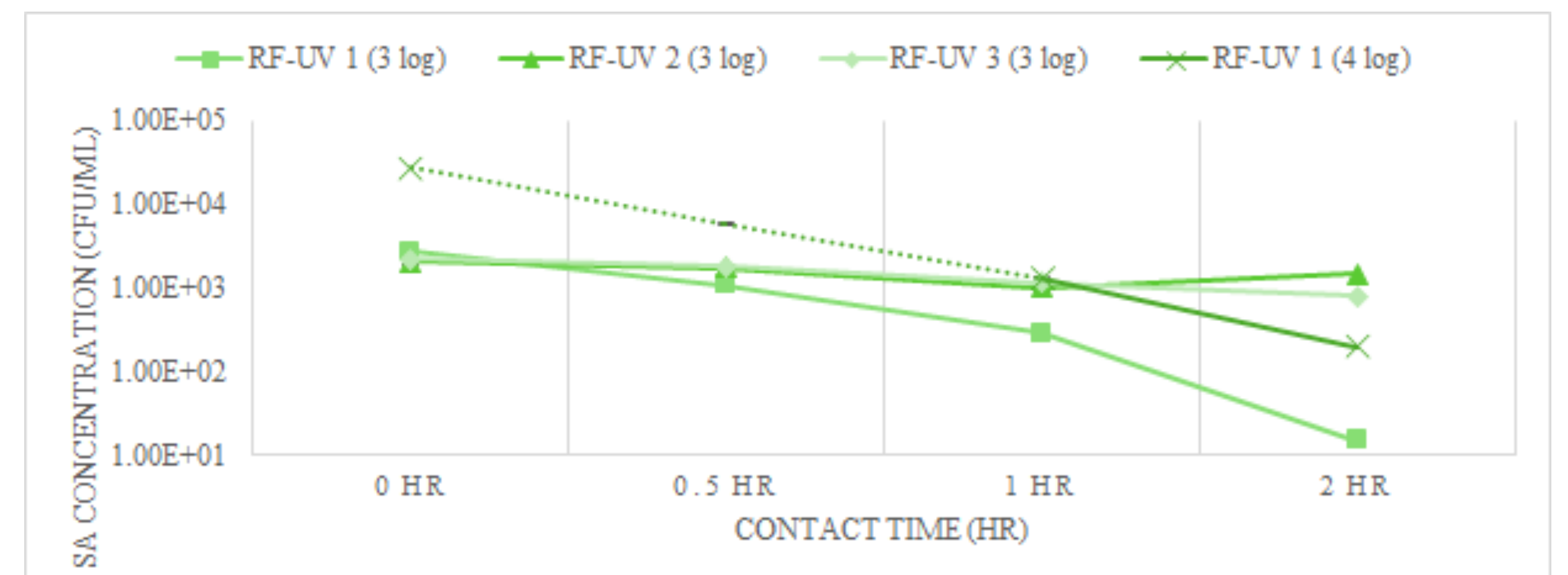
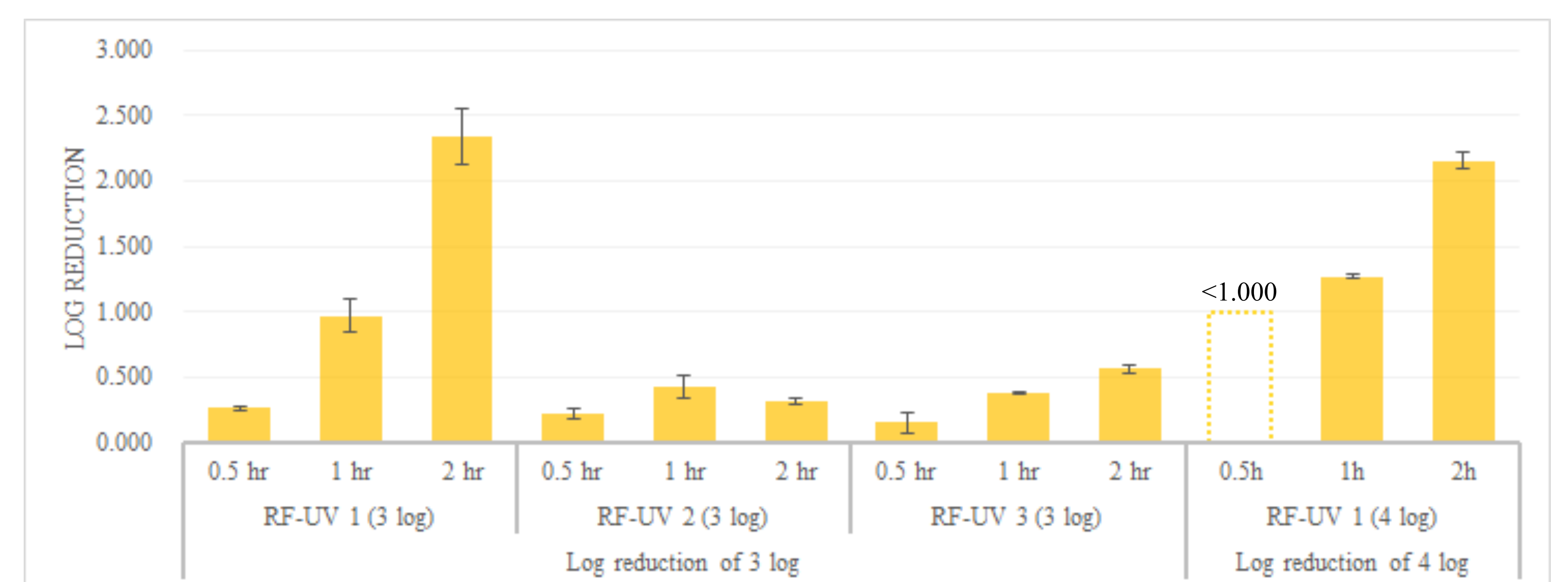


Figure 2. Influence of contact time on SA concentration in control group (Initial: 3 log CFU/mL)
 Figure 3. Influence of contact time on SA concentration in control group (Initial: 4 log CFU/mL)



*The dotted line of RF-UV 1 in contact with initial SA concentration of 4 log CFU/mL for 0.5 hr was an estimated value due to the exceeded colony number (>300 CFU/plate) during plate count.

Figure 4. Influence of contact time on SA concentration in treatment groups (Initial: 3 and 4 log CFU/mL)



*The dotted bar of RF-UV 1 in contact with initial SA concentration of 4 log CFU/mL for 0.5 hr was an estimated value due to the exceeded colony number (>300 CFU/plate) during plate count.

Figure 5. Log reduction of treatment groups affected by contact time (Initial: 3 and 4 log CFU/mL)

• Summary:

- Results indicated that gelatin with glycerol have no antimicrobial activity against *Staphylococcus aureus*.
- Antimicrobial efficacy of UV-induced gelatin edible films was enhanced under: (1) increased riboflavin concentration (2) treatment groups without lid (3) increased contact time

05. Conclusion

- The procedure of developing UV-induced gelatin edible films was proven feasible.
- Antimicrobial activity against *Staphylococcus aureus* was observed in UV-induced gelatin edible films.
- Future study may include its antimicrobial activity against other food pathogens.