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ABSTRACT

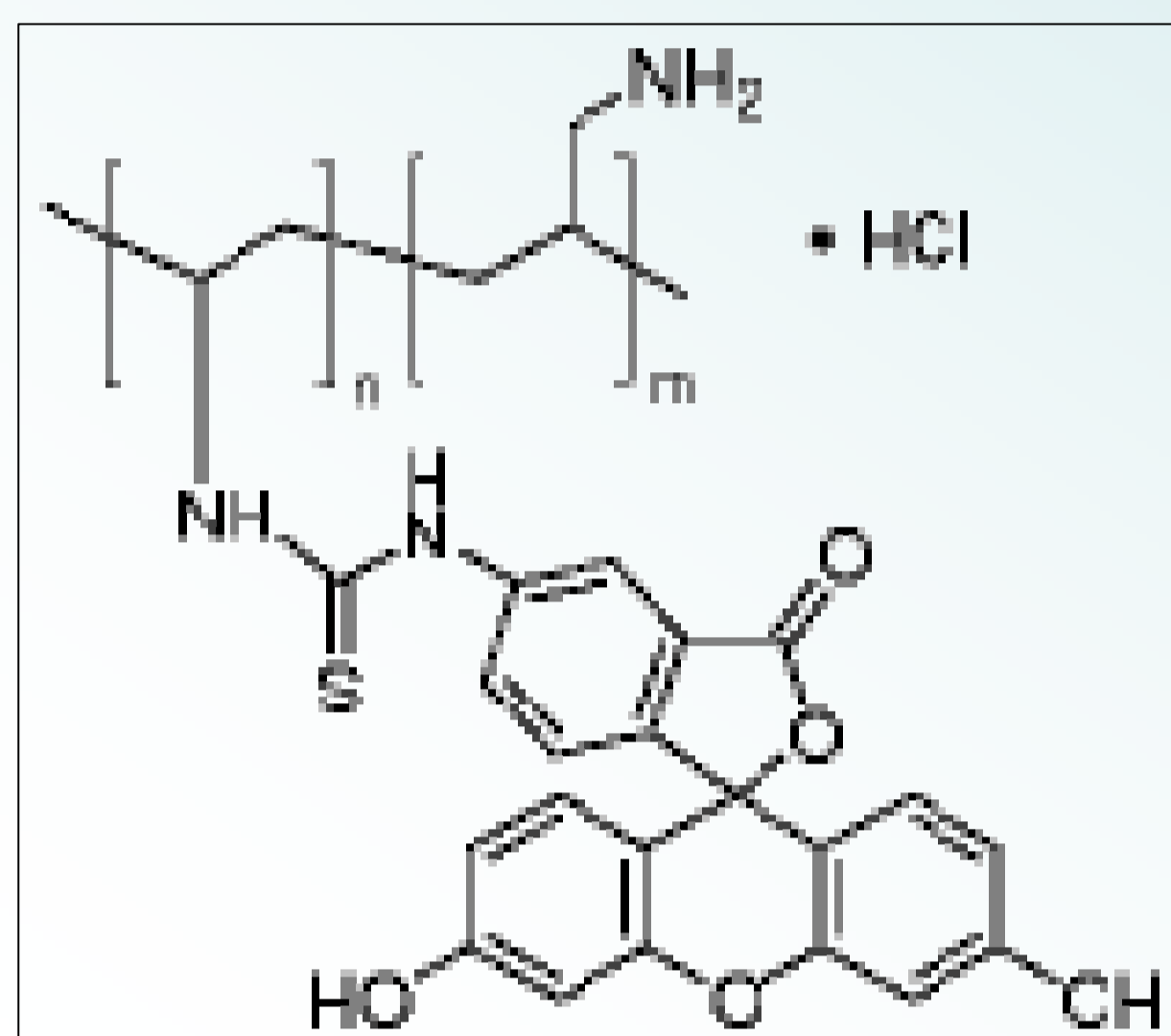
In this work, a novel antibacterial coating composed of SiO₂ and the polymer Poly(allylamine hydrochloride) (PAH) on glass slides by the technique Layer-by-Layer (LbL) is presented. The new nanotexturized LbL SiO₂ surface acts as antibacterial agent. The fabricated coatings have been tested in bacterial cultures of genus *Lactobacillus* to observe their antibacterial properties.

MATERIALS

Positive charged molecules

PAH

Poly(allylamine hydrochloride)



Negative charged molecules

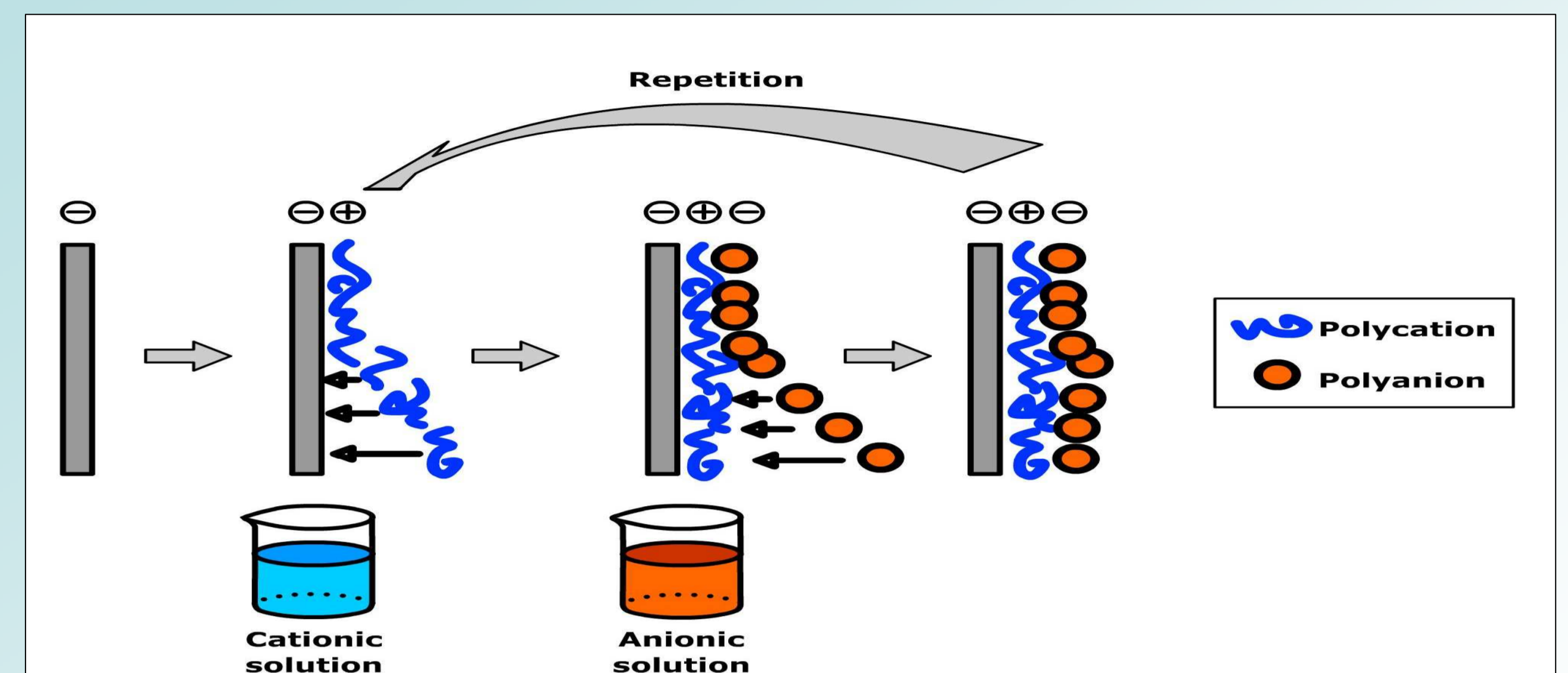
SiO₂

nanoparticles (20nm)

BACTERIA

Bacterial suspension composed of *Lactobacillus Delbrueckii* culture in "MRS Broth" at 37°C 24hours.

LbL TECHNIQUE



This technique is based on the electrostatic attraction between oppositely charged molecules or nanoparticles. This method allows the creation of organized nanostructures with controlled thickness and properties.

RESULTS

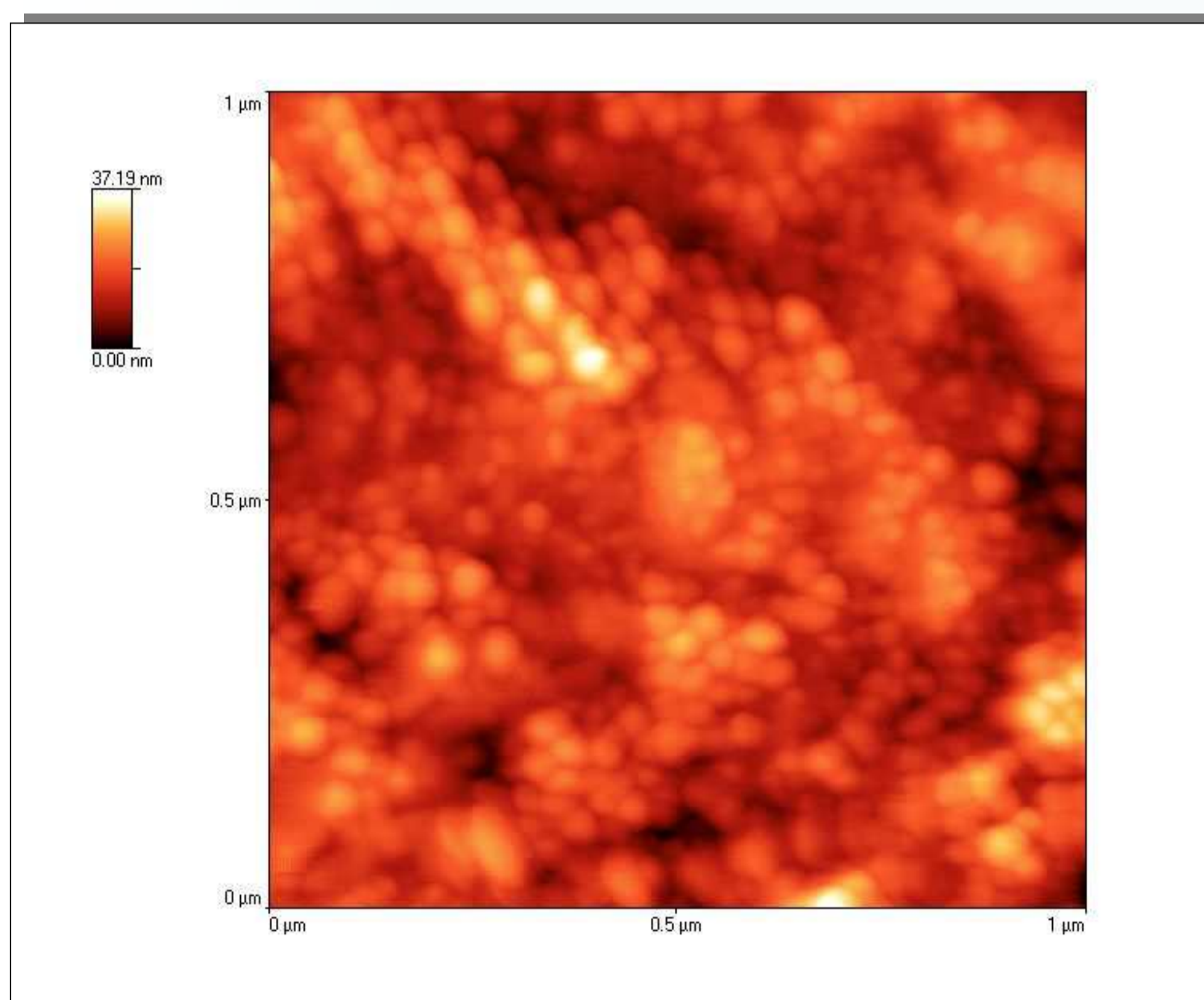


Figure 1

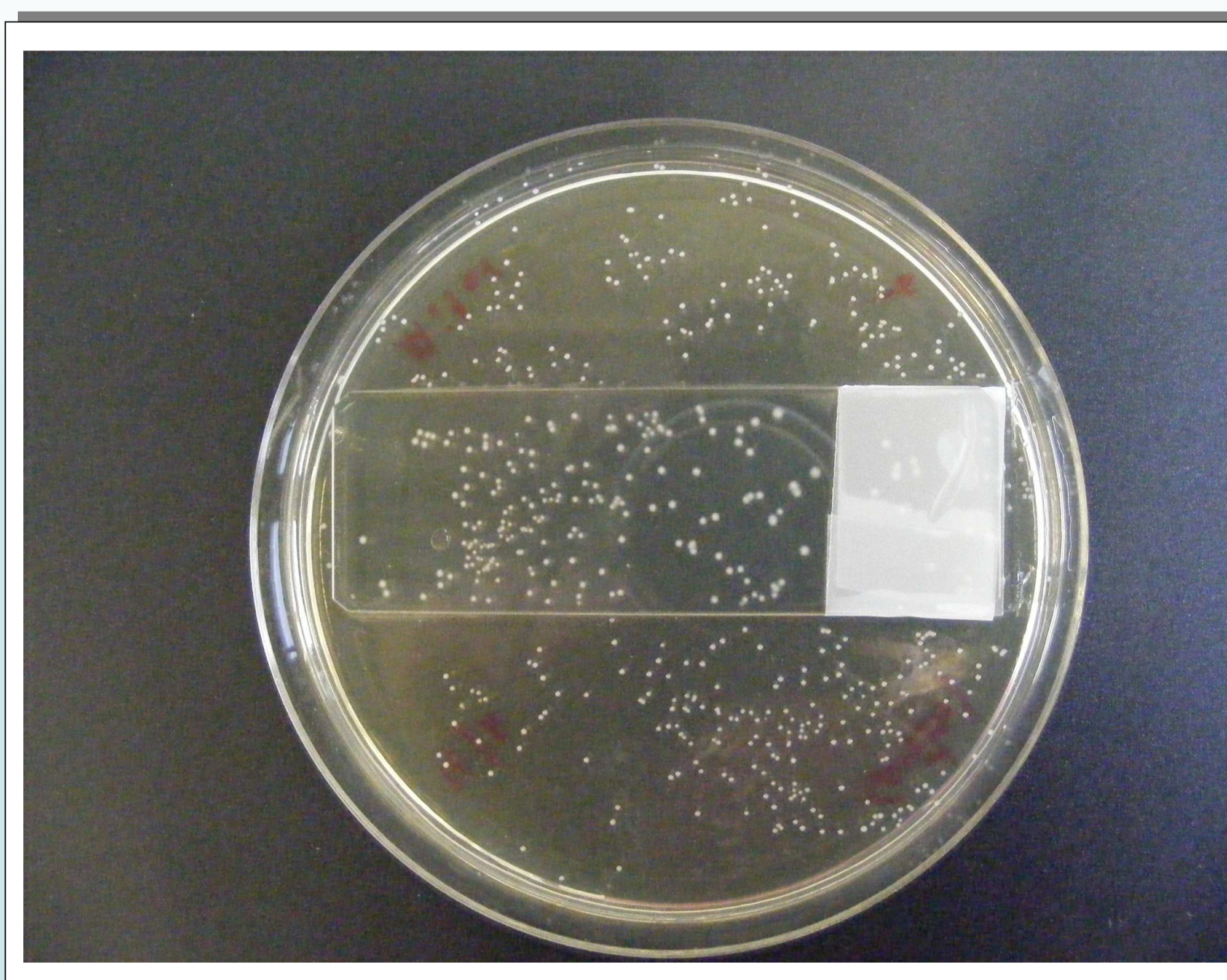


Figure 2

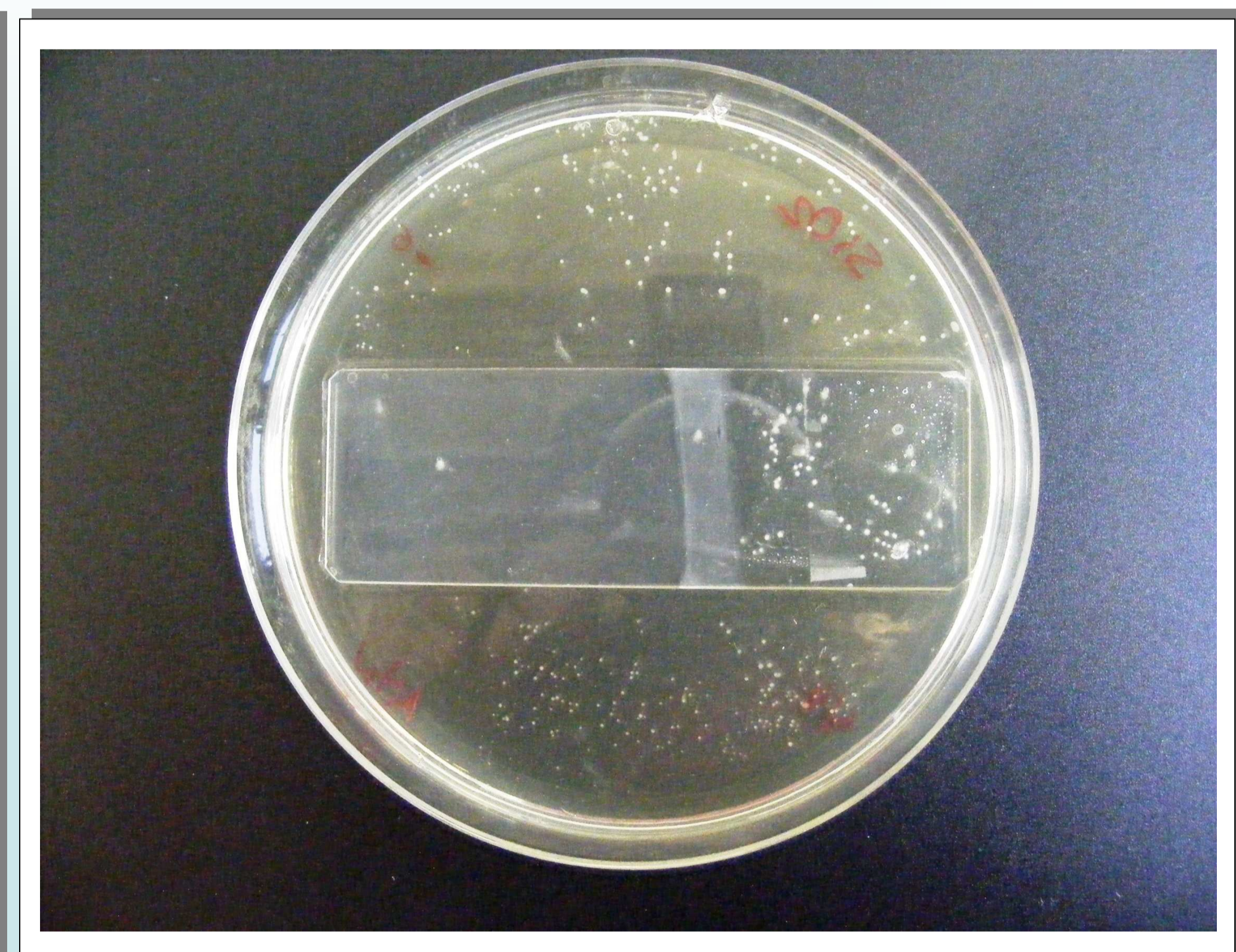


Figure 3

- **Figure 1:** 1x1µm AFM image of the PAH/SiO₂ multilayer.
- **Figure 2:** *Lactobacillus Delbrueckii* cultures after 24 hours in reference substrate.
- **Figure 3:** *Lactobacillus Delbrueckii* cultures after 24 hours in coated substrate.

- Bacterial suspension is diluted and spread uniformly on the agar slab in sterile Petri-dishes. Then, the PAH/SiO₂ coated substrates are placed on the agar slab. Petri-dishes are incubated 24hours at 37°C.
- The antibacterial activities are carefully measured by optical method.
- All the experiments are performed in triplicated.

CONCLUSION

- We propose an antibacterial surface composed of SiO₂ and PAH on glass slides by Layer by Layer. LbL coatings are performed by dipping the substrates into alternatively charged solutions. The dipping cycle is repeated until a total of 50 bilayers are constructed.
- The coatings are tested in *Lactobacillus Delbrueckii* bacteria culture to observe their antibacterial activities.
- The treated surfaces reach 90,5 ± 5 % (average ± std. deviation) of inhibition effect on the growth of *Lact. Delbrueckii* after 24 hours.
- It has been demonstrated these PAH/SiO₂ coating films have a very good antibacterial behaviour against *Lact. Delbrueckii*.

ACKNOWLEDGEMENTS

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