

# Microwave assisted synthesis of polyaniline/pullulan (PANI/Pull) composite

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## INTRODUCTION

**Modification of conducting polymers with biopolymers** has achieved great attention in scientific community. **This is because of the possibility to develop and tune materials with improved characteristics.**

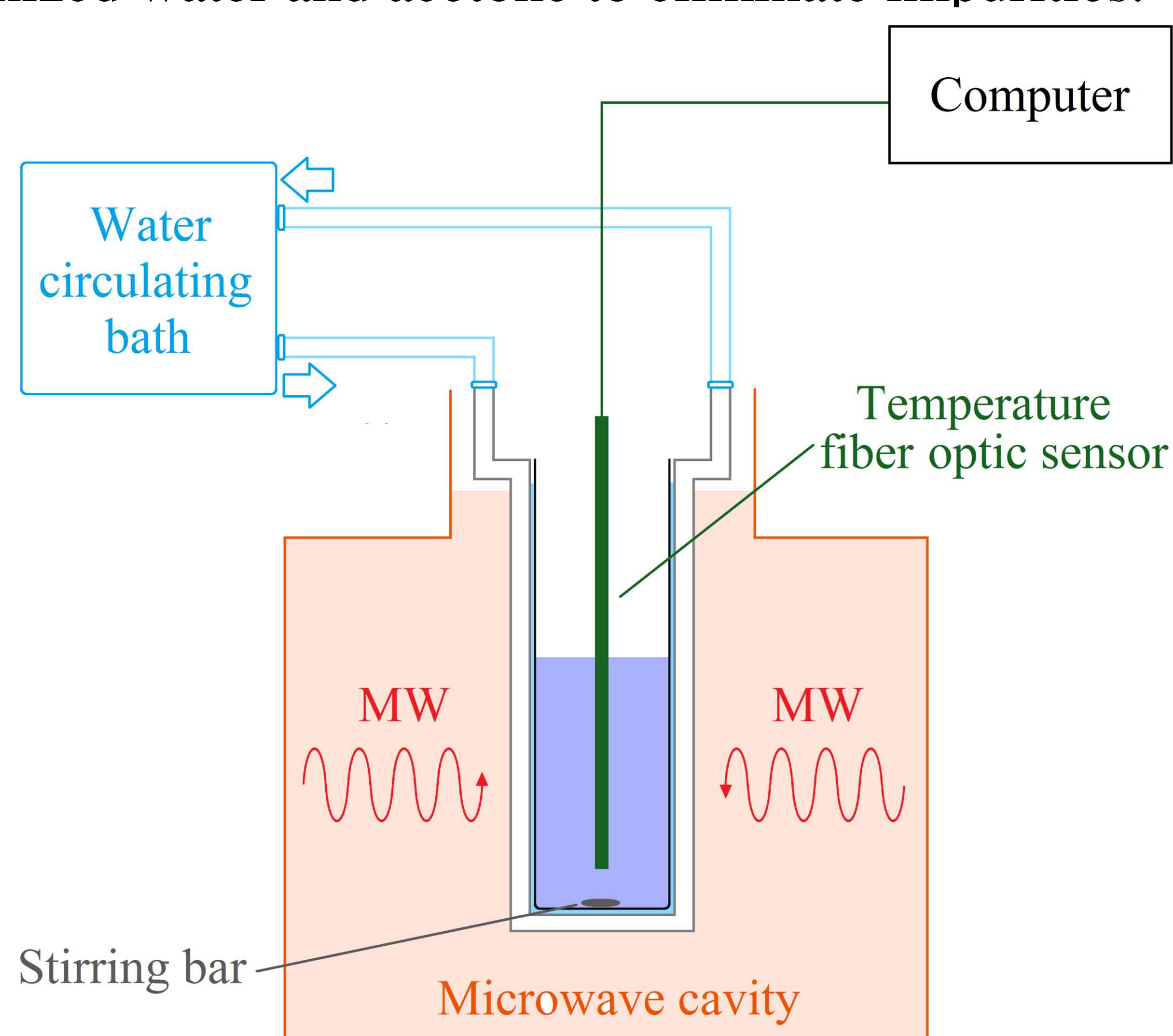
The aim of our work was to test the ability to synthesize novel composite by **modifying PANI with pullulan**. Thanks to pullulan's biocompatibility, non-toxicity, biodegradability and wide range of applicability, this polysaccharide seemed to be a good candidate as a potential PANI modifier.

## EXPERIMENTAL

PANI and PANI/Pull composite were prepared by **aniline oxidation with potassium iodate**.

The 12 mL of aqueous solution containing 1.25 M HCl, 0.432 g KIO<sub>3</sub> and 0.343 g pullulan was thermostated at 4 °C before MW irradiation took place. When reaction mixture achieved T = 26 °C, 0.480 mL aniline was added. Balanced application of cooling and MW heating enabled maintenance of the working temperature within ± 2 °C. MW synthesis was carried out for **10 min under constant irradiation power**. Absorbed MW power (calculated by calorimetric method), was (10.0 ± 0.5) W.

Product was obtained by centrifugation, washed with HCl, deionized water and acetone to eliminate impurities.



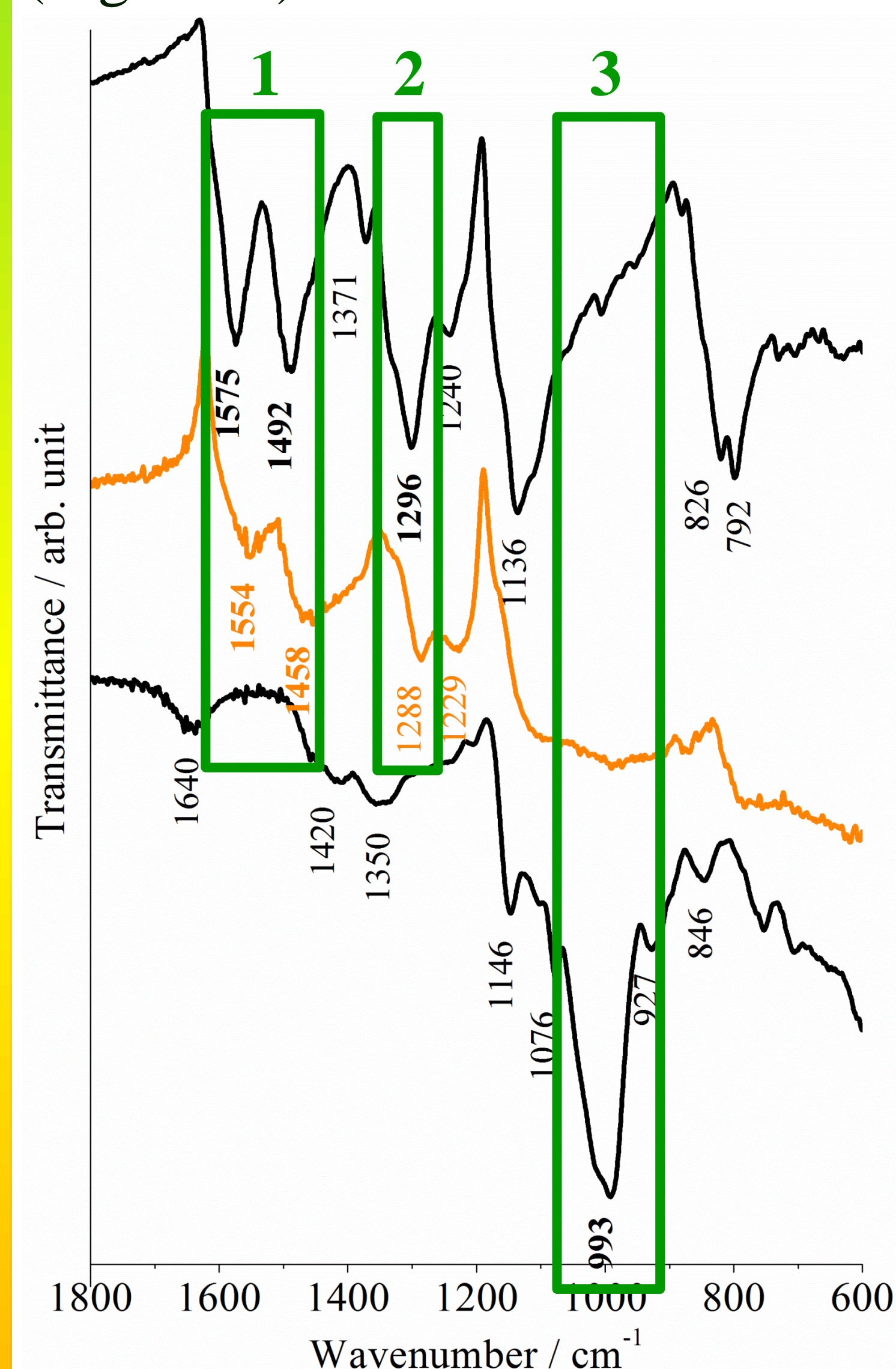
**Figure 1.** Schematic view of the MW experimental setup.

## RESULTS AND DISCUSSION

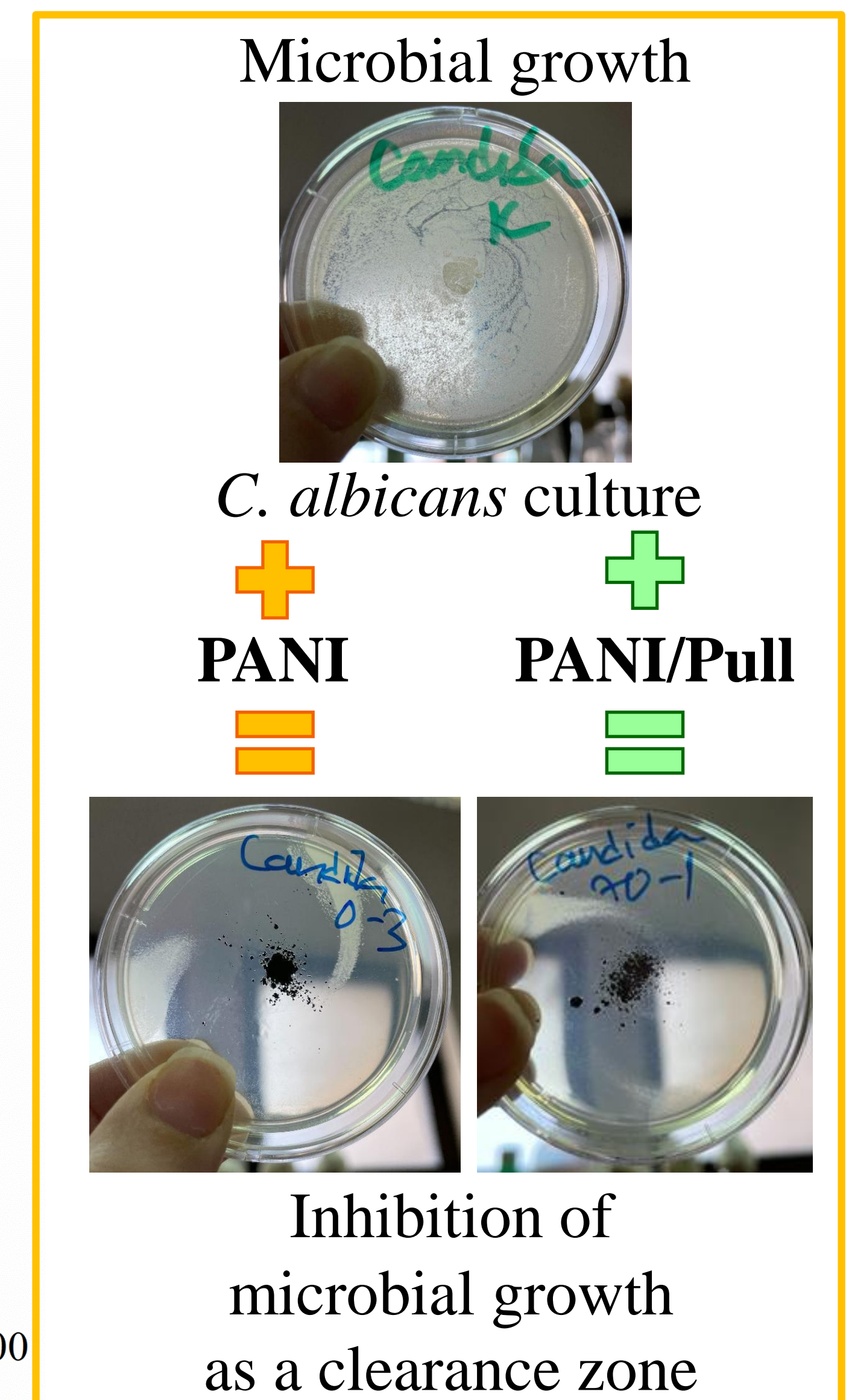
FTIR spectra confirmed modification of the PANI bands by pullulan and its incorporation in PANI structure (Figure 2.):

1. Red shift of **quinonoid and benzenoid ring-stretching vibrations**;
2. Weakened band of **C-N stretching of secondary amine**;
3. Increase in **adsorption at about 1000 cm<sup>-1</sup>**.

**High sensitivity of *C. albicans* to PANI and PANI/Pull.** (Figure 3.)



**Figure 2.** The ATR-FTIR spectra of PANI (upper), **PANI/Pull composite (middle)** and pure pullulan (lower).



**Figure 3.** Qualitative antimicrobial evaluation of PANI and PANI/Pull on *C. albicans* culture.

## CONCLUSION

PANI/Pull composite was synthesized by MW assisted method under constant irradiation power and temperature. **FTIR spectra confirmed** incorporation of pullulan in PANI structure in the PANI/Pull composite. Qualitative antimicrobial test showed that **PANI/Pull has a high antifungal effect against *C. albicans***. Obtained results encourage further investigations.

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