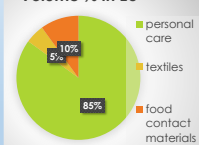


### Actually...

The constant need of antimicrobial properties in personal care led to the wide use of Triclosan almost everywhere<sup>1</sup>

Volume % in EU



Soaps and detergents



Kid's toys



Surgical wires and ureteral stents

Consumer products containing Triclosan totaled 890 Million \$ worldwide [FDA, 2013]

### The Need U.S. FDA halts use of some organic molecules in health care antiseptics



- bioaccumulation and persistence in human fat tissue, umbilical cord blood, human breast milk, and urine.<sup>2</sup>
- multidrug-resistance in microbial communities.<sup>3</sup>
- it is linked to allergies, asthma, and body malformations.<sup>4</sup>
- already in the urine of 75% of Americans.<sup>5</sup>

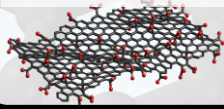
### The Solution

### A Nanotechnology-based approach

Different properties of different nanosystems were combined together to obtain a multifunctional tool...



#### Graphene Oxide



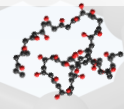
- prevent bacterial adhesion
- high surface area-

#### AgNPs



- broad-spectrum antibacterial agent

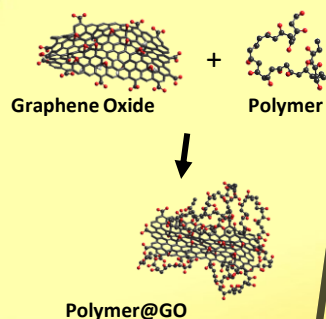
#### Polymers



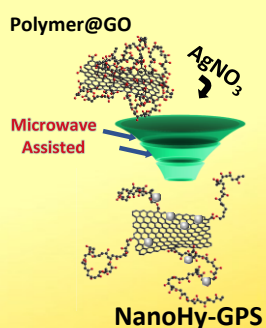
- adhesiveness and substrate compatibility

### Synthesis procedure<sup>6</sup>

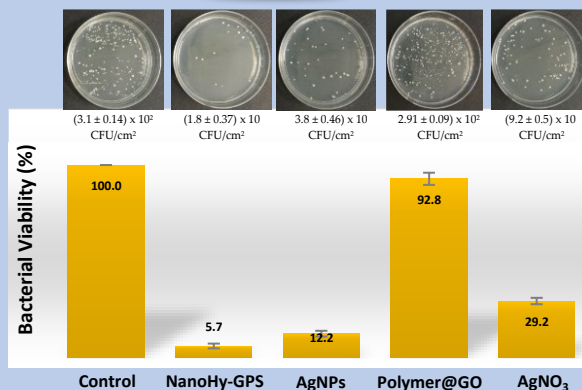
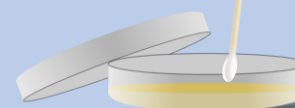
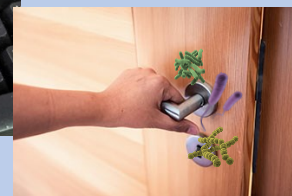
First Step: Polymer functionalization



Second Step: AgNPs decoration



### Antibacterial activity: proof of concept



### Nano-HyGPS features

- ✓ **Active** against bacterial population of common hand-contacted surfaces
- ✓ **On-demand tuning of the interfacial interactions:** a grafting-to reaction to bind any polymer having hydroxyl/amino groups
- ✓ **Suitable** for coating or blending or spraying onto materials.

### The impact

- 📍 Long-lasting coating having Improved antimicrobial activity
- 📍 Avoid bacteria multidrug-resistance
- 📍 Drug loading
- 📍 Universally applicable
- 📍 High Market potential

### References

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