# Using FOAMSCAN™ to characterize foams produced by an external device

## INTRODUCTION

Hands disinfection particularly arose over the covid19 sanitary crisis. Because they are convenient in use and cost-effective, foam dispensers are commonly used to deliver hands-disinfectant in the form of foam. The foam is generated by pressing the actuator of the dispenser. Then a volume of air is injected into the disinfectant solution while it is pumped, which produces the foam. For hands- disinfectant manufacturers, it is of the utmost importance to control the volume of foam delivered by the dispenser and the properties of the foam, such as stability or texture, when it is mashed in the hands.

FOAMSCAN™ foam analyzer enables to characterize the foam properties by measuring 2 key parameters: liquid fraction and foam structure (size and distribution of the bubbles).

## METHODOLOGY

FOAMSCAN™ foam analyzer is used to study 3 foaming solutions A, B and C produced by 3 foam dispensers. Foam A is made from an hydroalcoholic solution, Foams B and C are made from water-based solutions.

FOAMSCAN™ software measures foam volume and foam stability over the time whereas the structure of the foam (bubble size and distribution) as well as foam liquid fraction is analyzed using the CSA software.

Foams A, B, C are directly produced from the dispensers into a Quartz glass cuvette (ID 25*25*65 mm) equipped with prisms. Measurement starts right after filling the cuvette with foam and lasts for 600 sec.

Experiments are performed 3 times to ensure measurement reproducibility.

FOAMSCAN™ foam analyzer - experiment setup

## FOAM PROPERTIES ANALYSIS

After foam formation, the images of the foam structure show that Foam A exhibits homogeneous bubbles in size while foams B and C are more heterogeneous in bubbles size (Fig.1). The large field of view (10 mm²) allows to visualize several hundreds of bubbles (more than 700 for foam A at start) and ensure a good statistical representation of the bubble's population.

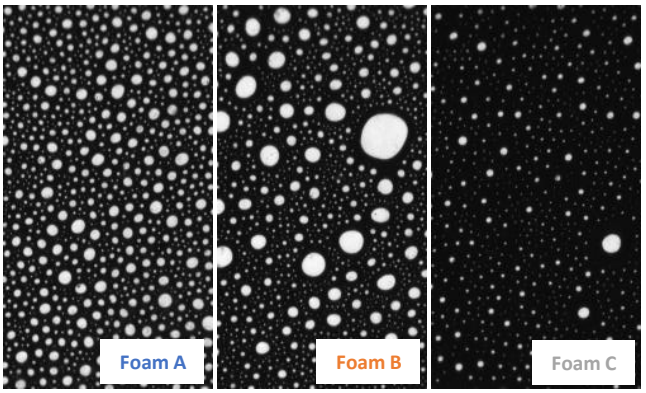


*Fig. 1 Foam bubbles images captured by the CSA camera just after foam production, bar = 2.3 mm*

The statistical analysis of the foam structure over time shows that although the 3 foams are similar in bubble's size, just after being formed; they are ageing differently. Indeed, at t=10 sec., average mean radius is 35 µm, 45 µm and 55 µm for the foam C, B and A respectively (Fig.2). Foam C bubbles size increases very quickly from 35 µm to large bubbles up to 0.5 mm mean radius; while foams A and B bubbles' size growth is much lower and slowly than foam C. The increase in bubble size is explained by 2 simultaneous foam aging mechanisms which are ripening and coalescence [Boos 2013].

The analysis of the polydispersity index from T=0 to t=100 sec. (Fig.2) indicates there are more coalescence events in foam C while the stability of the polydispersity index for foams A and B suggests fewer coalescence events and more ripening i. e. gas transfer from the smallest to the largest bubbles.

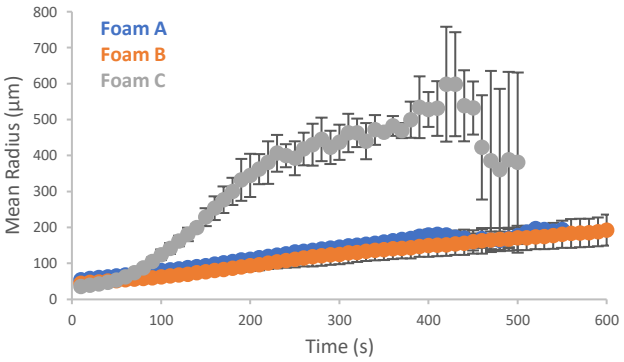


*Fig. 2 Foam Structure analysis with CSA software*