



DPF DESIGN CONCEPT AND CATALYST COAT-ABILITY INVESTIGATION

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INTRODUCTION

The basic concept of hexagonal channel design could be from lower backpressure under soot-loading stage and higher ash-capacity related directly to the longer periods of DPF usage. The structure has recently been progressed to create more surface area to accumulate the catalyst material inside inlet channel of DPF through the wavy-wall technology. It has been named as **'Microgear'** design.

A model-coating study indicated the creation of higher surface pore after high wash-coating resulting in lower transient backpressure with lower gas velocity in wall-through process. Herein, the highlight is the dependence of coat-ability for this wavy-designed hexagonal DPF on backpressure compared to normal wall one as a reference.

Motivation and the aim of this study is providing *new technology* and *new generation filters* on market.

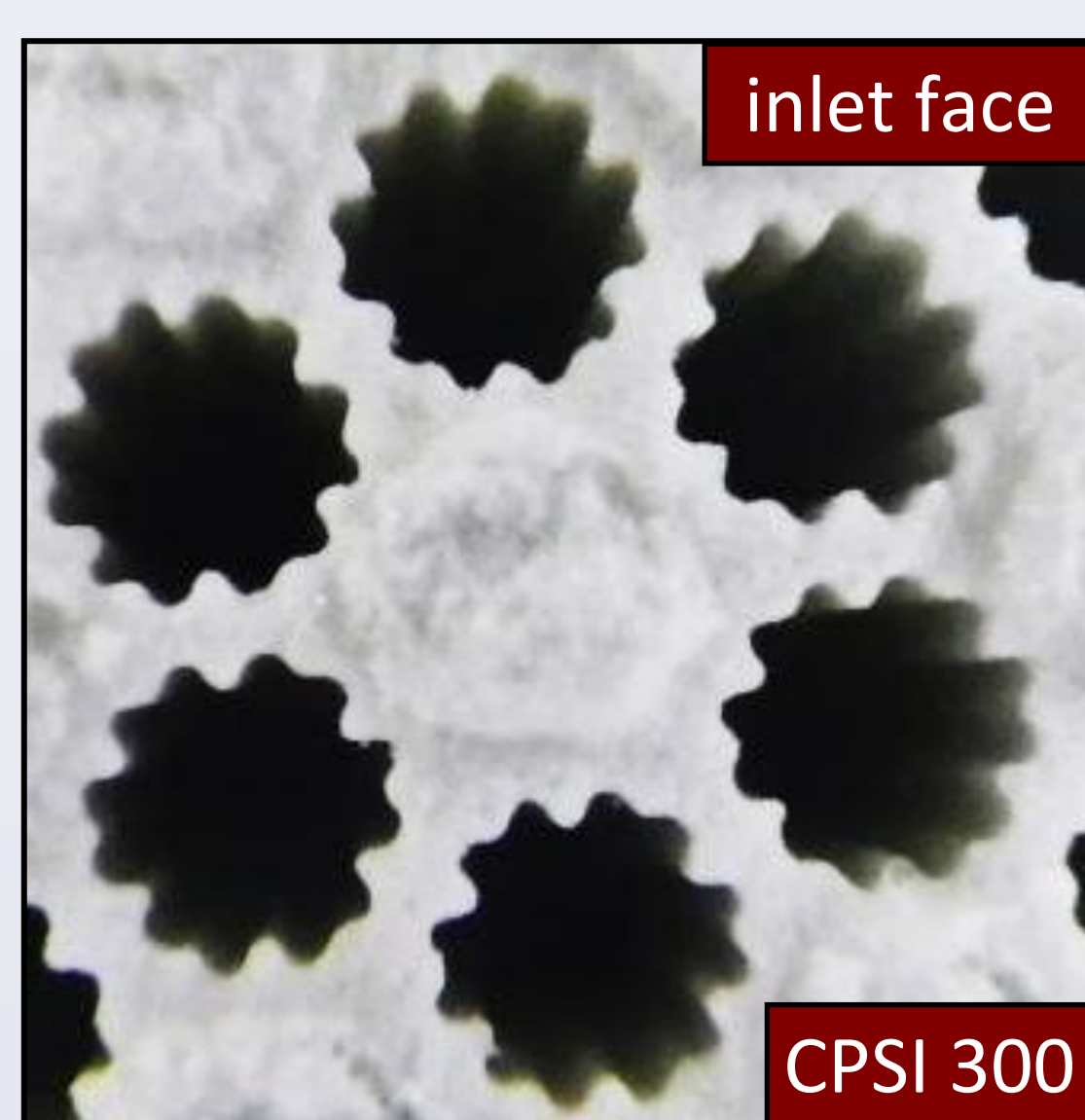


Fig. 1. 'Microgear' structure

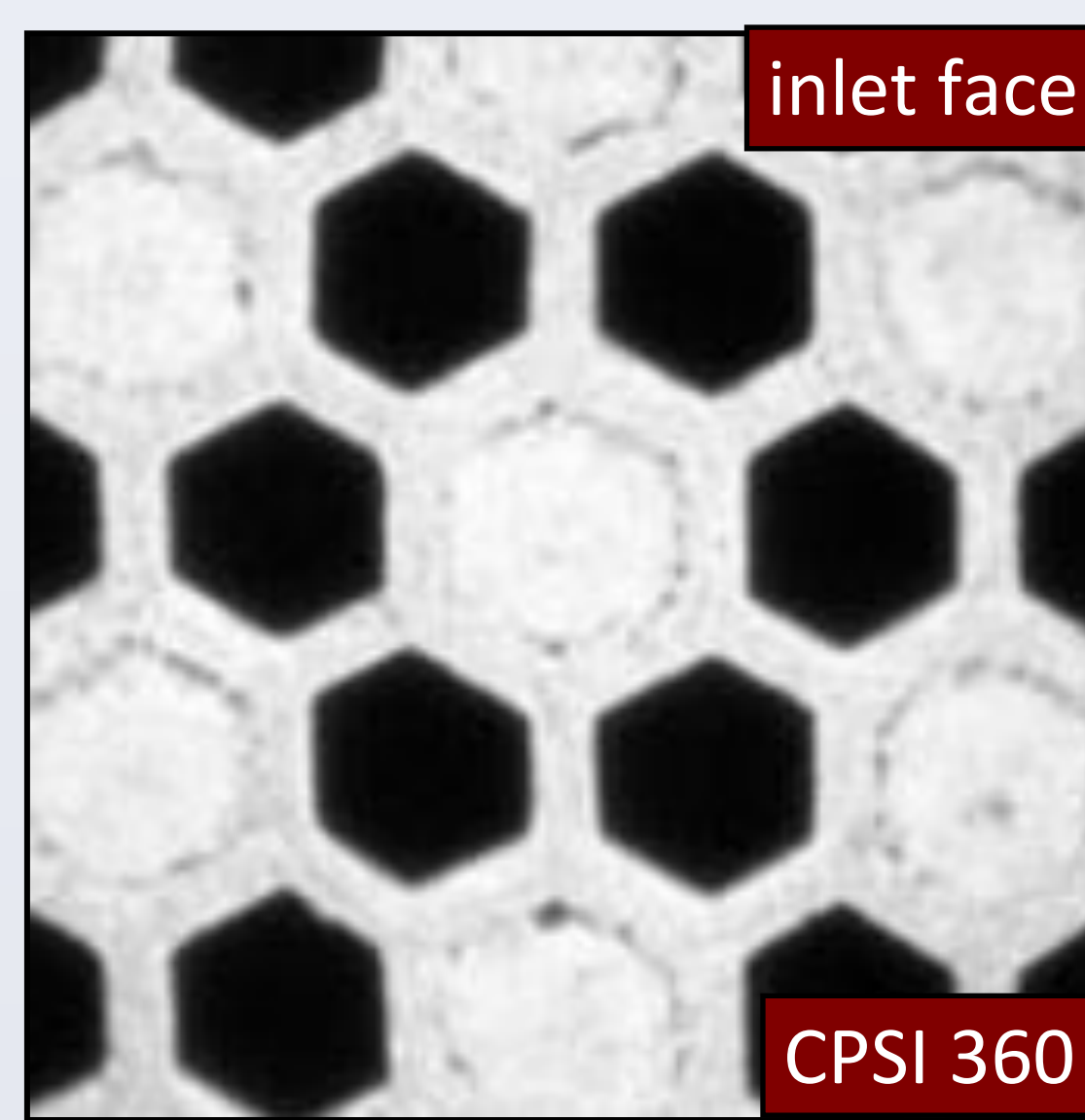


Fig. 2. Hex structure

DPF characteristics

- ✓ Filtration performance
- ✓ Catalyst coatability
- ✓ Low backpressure with high washcoat load
- ✓ Long lifetime (ash capacity)

OBJECTIVE

Hex and Microgear structures show different SLBP response depending on washcoat distribution (zone coating). The reason of such performance is different size and quantity of cells in inlet and outlet side.

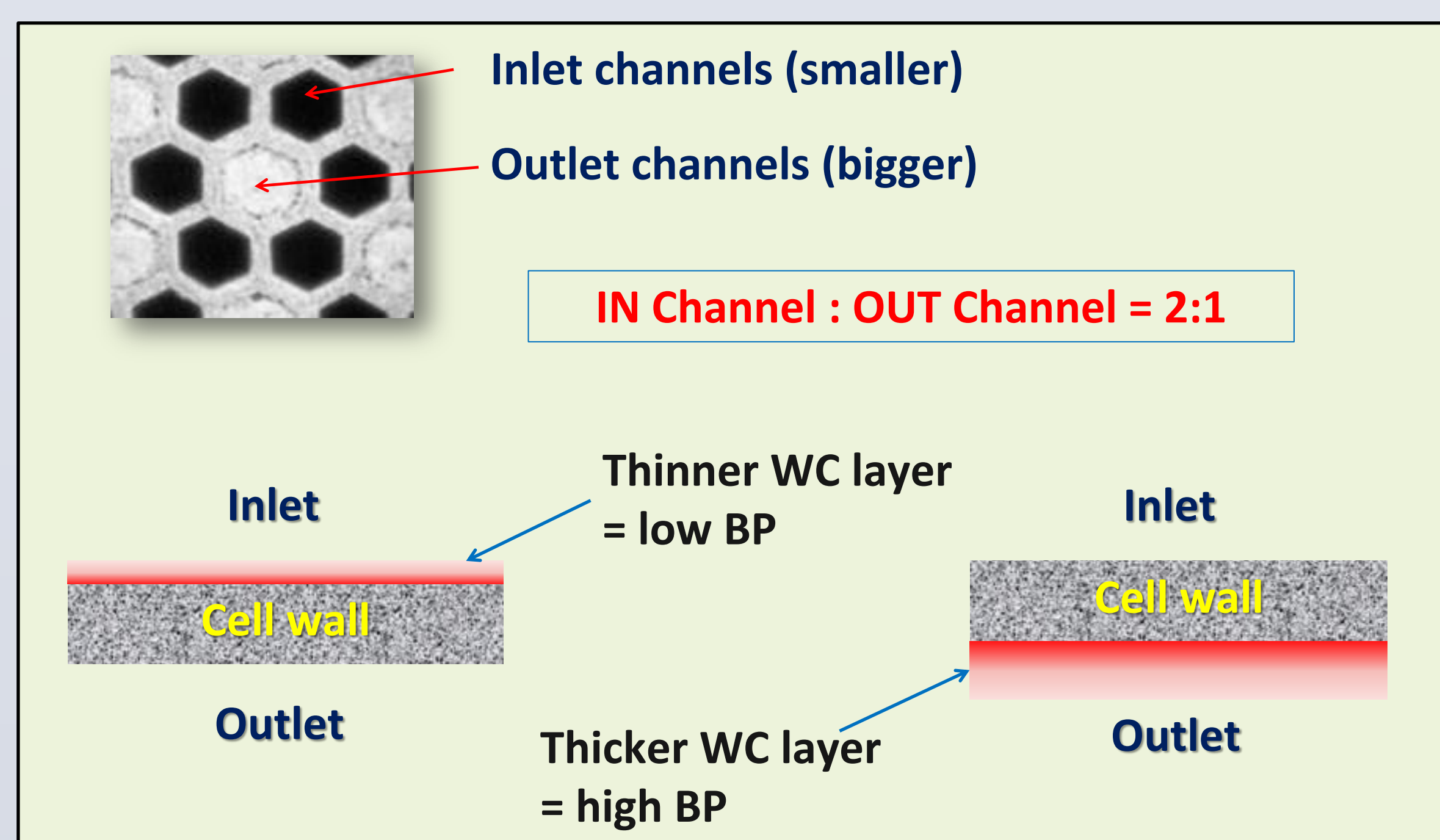


Fig. 3. Difference of WC distribution in IN and OUT channel

EXPERIMENTAL

Both types of filters were coated with increasing amount of washcoat (up to 50g/l) and SLBP was measured according to belows scheme:

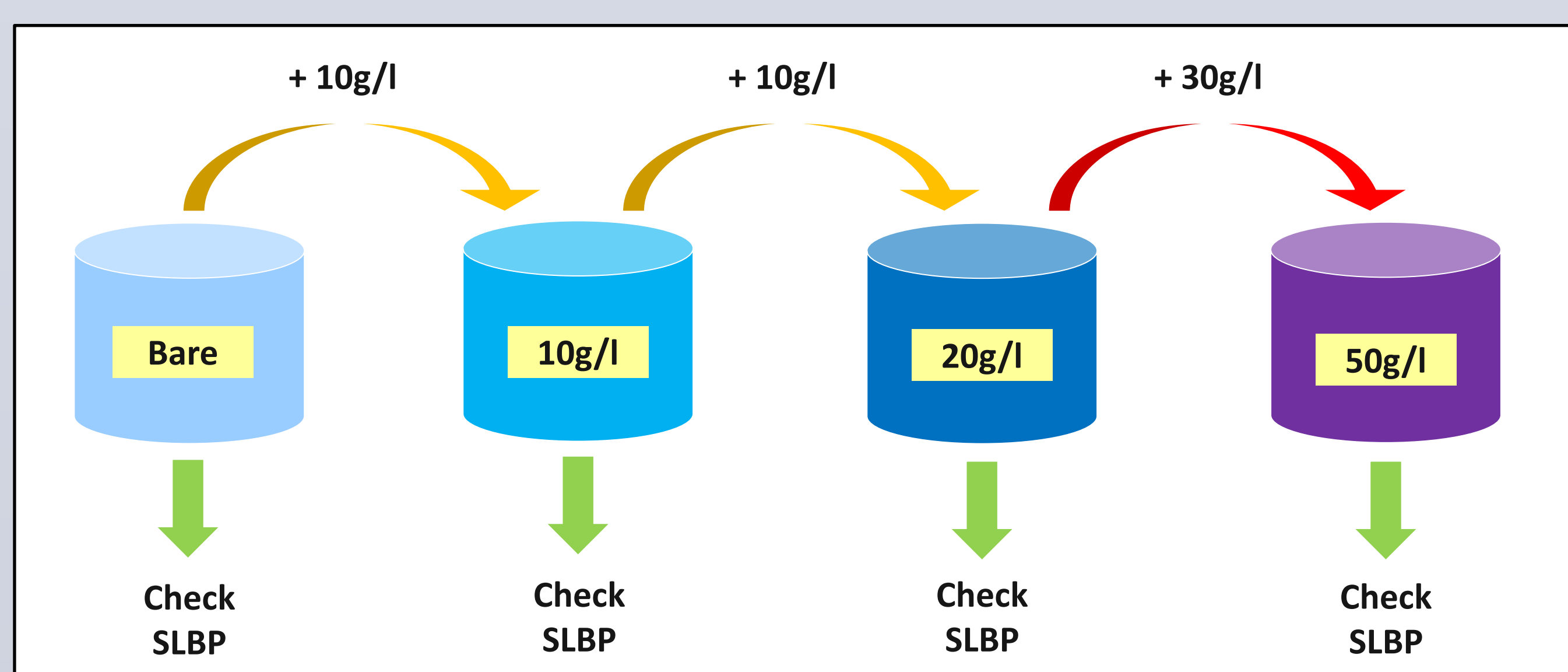


Fig. 4. Scheme of coating method for Hex and Microgear

RESULTS AND DISCUSSION

Microgear filters present up to 10% lower SLBP compared to standard Hex structure. Zone coating effect is visible in backpressure response as well.

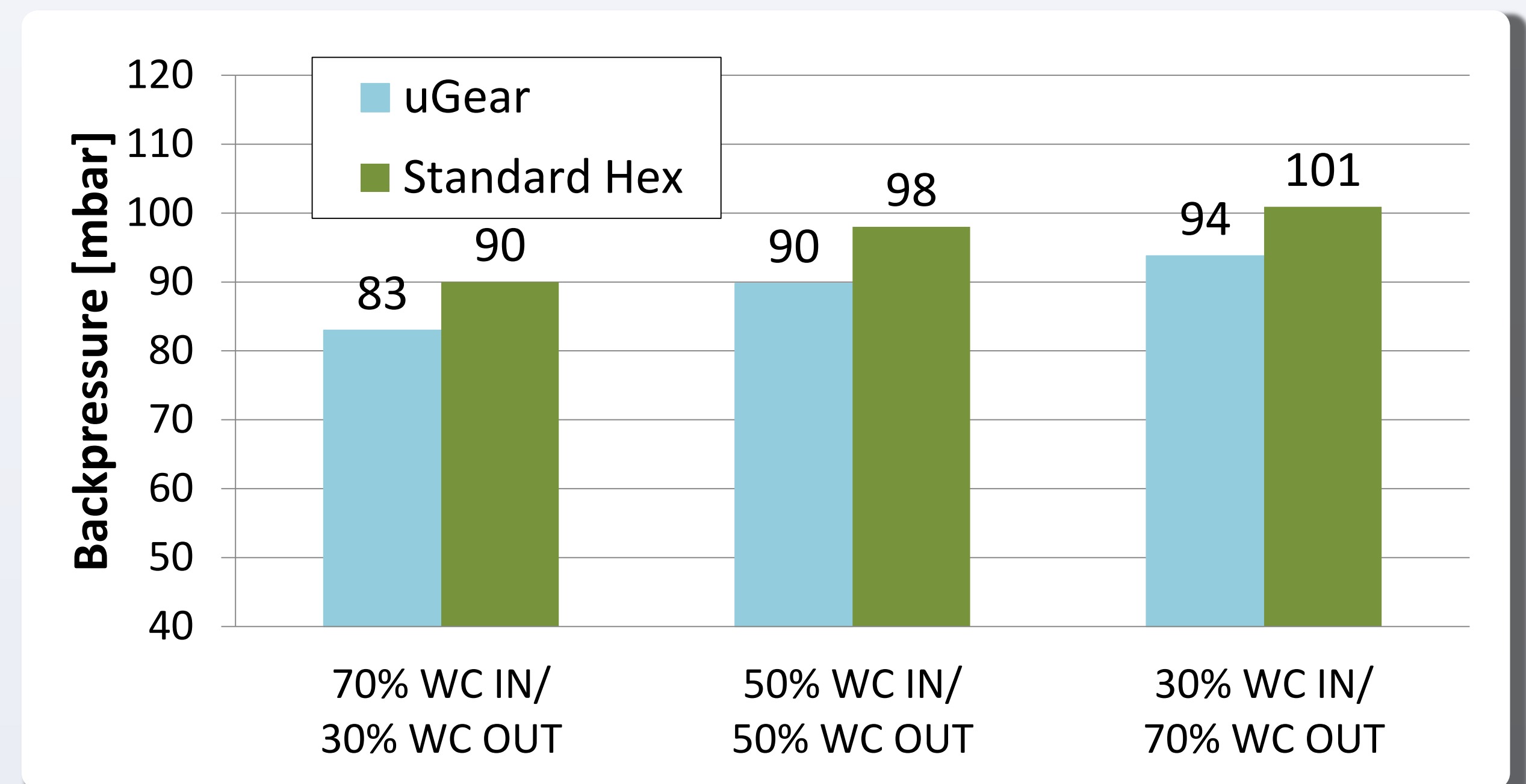


Fig. 5. Soot Loaded BP @ 4g/l: Microgear vs. Hex (zone coating)

Also with high soot load amount **Microgear** structure shows better performance than standard Hex which valuable in case of high WC amount.

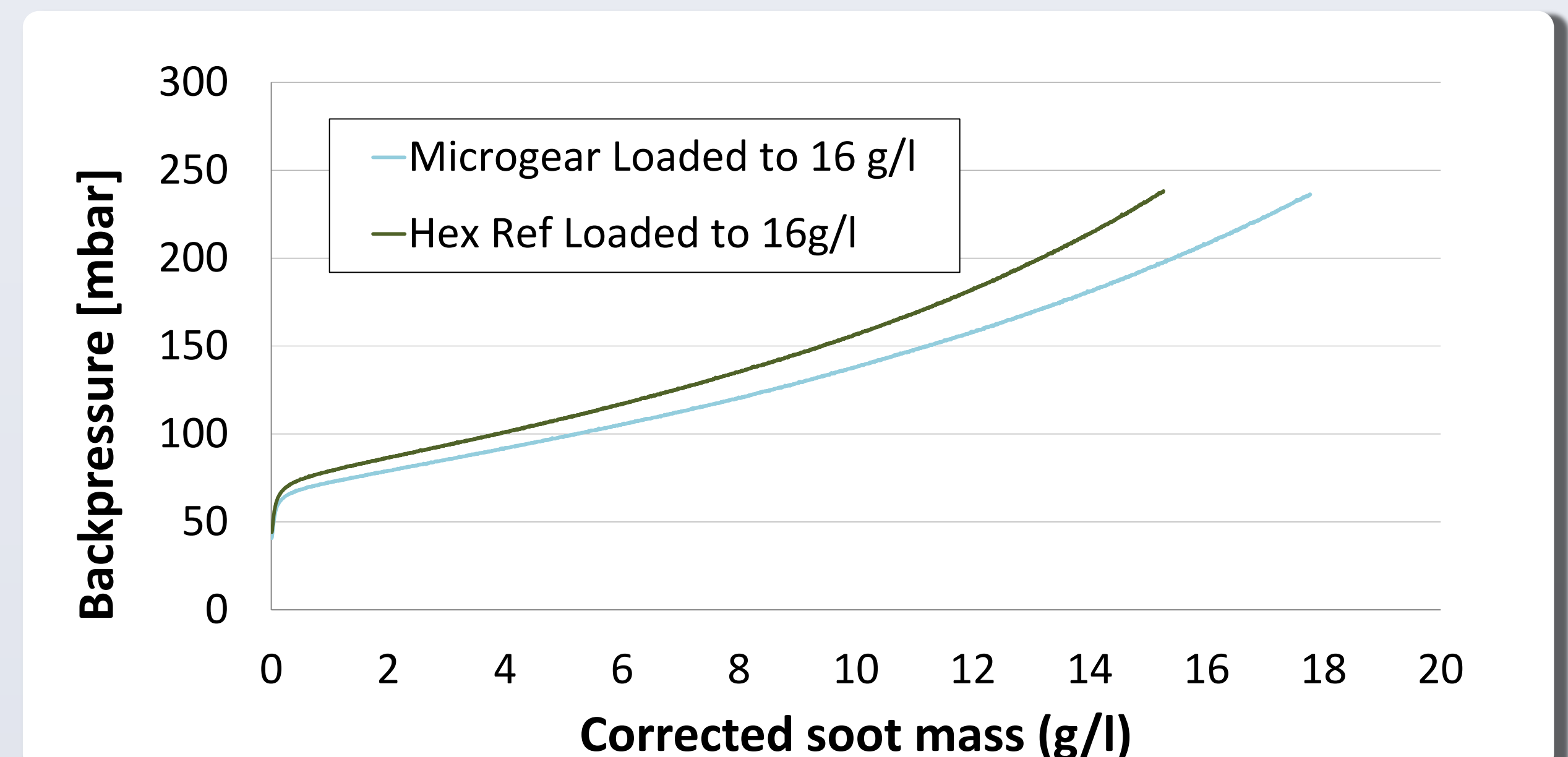


Fig. 6. Microgear vs. Hex 30% WC IN / 70% WC OUT

With high WCL **Microgear** still presents benefit in SLBP compared to Hex

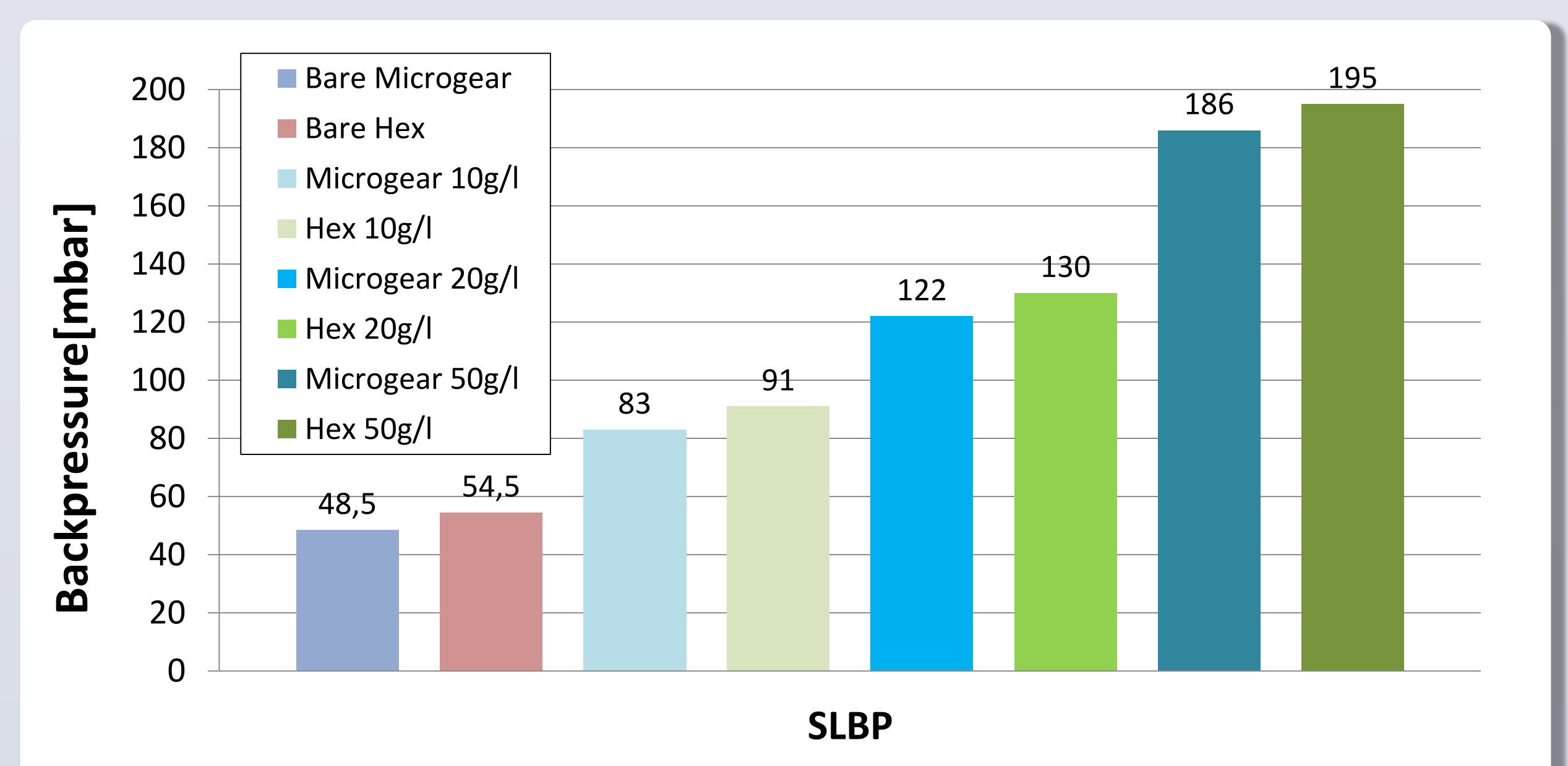


Fig. 7. Microgear vs. Hex (30% WC IN / 70% WC OUT)

Lower BP response in **Microgear** comes from uncoated 'convex' areas in inlet side clearly visible on below pictures (50% WC IN/50% WC OUT)

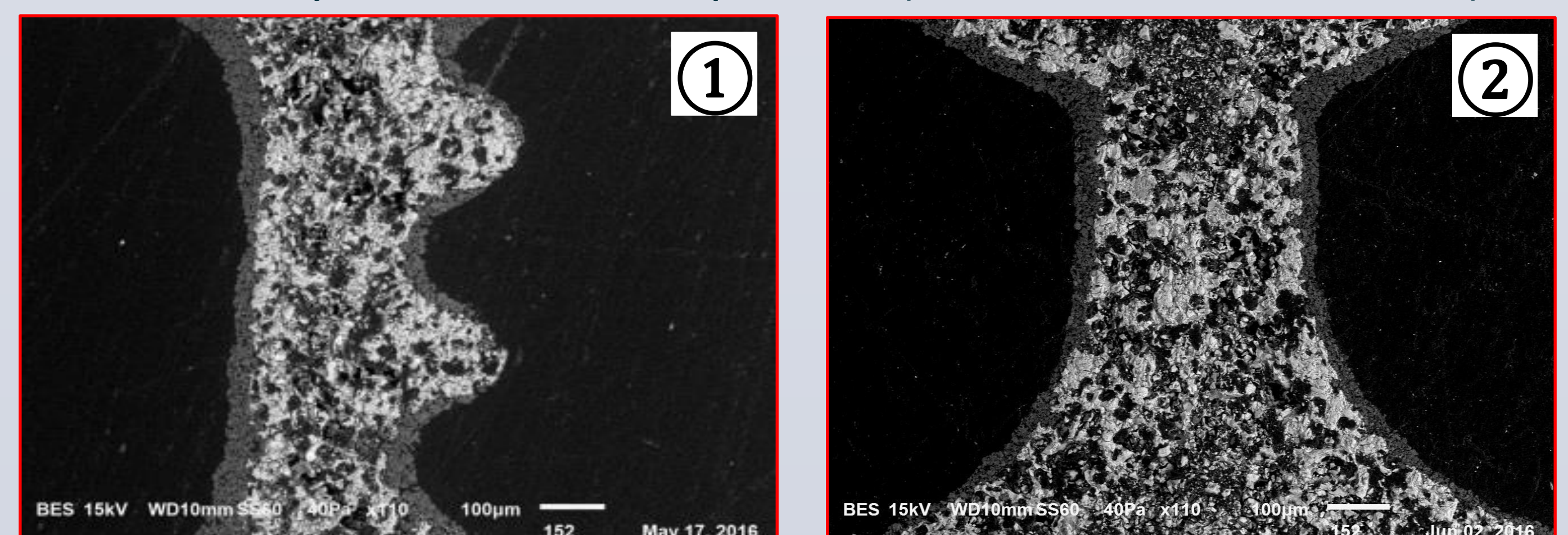


Fig. 8. WC distribution, 50g/l: 1 – Microgear, 2 – Hex

CONCLUSIONS

It was interestingly shown that coating location improves backpressure response. The microscope observation indicated the wash-coat status deposited on the way wall influences the soot-cake formation corresponding to backpressure behavior. Thus-obtained output among wavy-wall structure should be useful for its indication of other functionality such as catalyst performance while the related-study is underway.