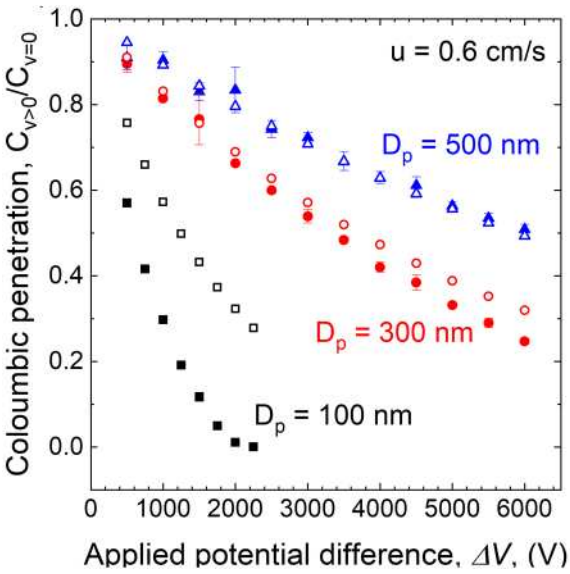

Figure 2. Coulombic penetration as a function of applied potential difference at a constant mean velocity u = 0.6 m/s for three particle diameters: D_p = 100 nm (black), D_p = 300 nm (red), D_p = 500 nm (blue). Filled symbols are for experiments and open symbols for simulations.

The experiments and simulation are in excellent agreement for particle diameter equal to 500 nm. For the smaller sizes (300 nm, 100 nm), we observe a discrepancy between experiment and simulation which enlarge according to potential difference applied to the grids. It should be noted that Brownian motion is not taken into account in the simulation; nevertheless, this fact cannot explain the discrespancies, especially as the difference between experiments and simulation increases with enhanced voltage. Further investigations will be necessary to properly interpret these differences; in particular on deposition inside the grids holder system, on the slip correction factor used in simulations or on more tricky phenomenon like interaction between interception and diffusion.

4. CONCLUSIONS

To the authors' knowledge, the experimental methodology in the present work is the first to control all aspects of the filter media and aerosol as to achieve comparison for fiber electrostatic filtration efficiency with simulations without any fitting parameters. As such, the experimental and simulation methodologies developed here provide valuable tools to address remaining open questions in electrostatic filtration from a fundamental, rather than empirical, perspective.

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