Supplementary Information

Continuous Floc Image Analyser (*C-FIA*) For Tracking Floc particles Dynamics During Coagulation-Flocculation-Settling Processes

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- Number of pages (including this cover sheet): 9
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- Number of tables: 1 (Table S1)
- Number of appendices: 1 (Appendix 1)

a1) Myponga River sample treated with *51 mg* L^{-1} alum

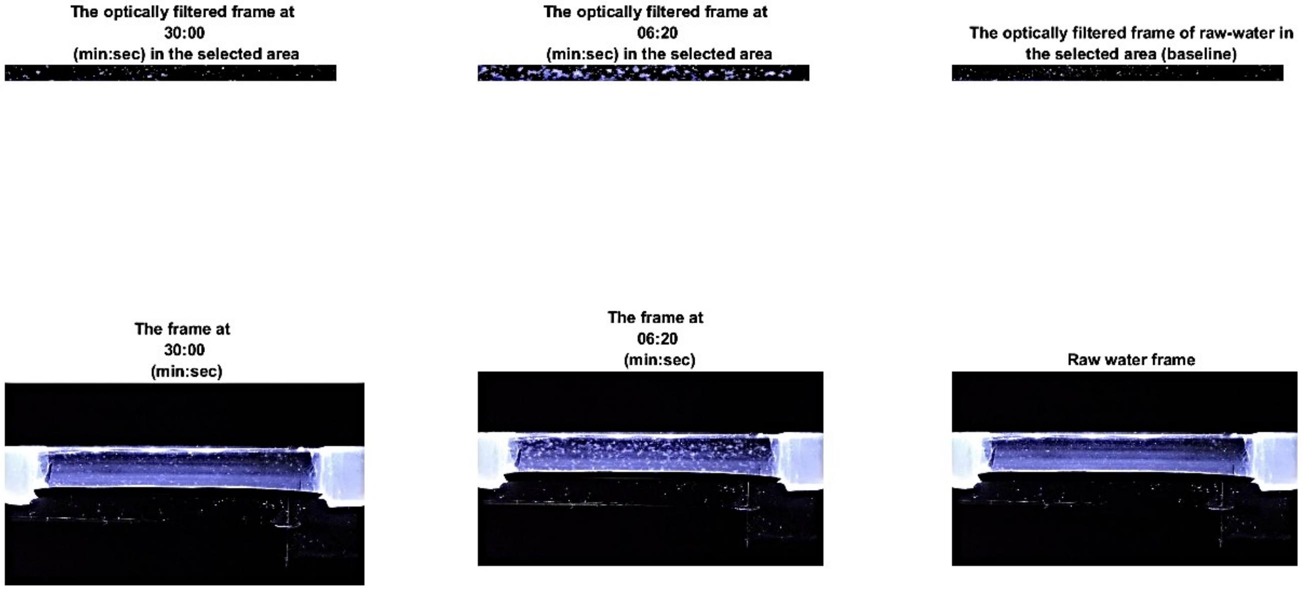


Fig. S1 Video frames and their corresponding optically filtered selected pixels-area for (a) C-FIA data extraction in raw water, (b) flocculation and (c) end of settling stages of Middle River sample (202 mg L^{-1} alum dose); *The corresponding extracted C-FIA FI data are presented in Fig. 5; **The corresponding video recordings are presented as Supplementary Information.

a2) Myponga River sample treated with *101 mg* L^{-1} alum

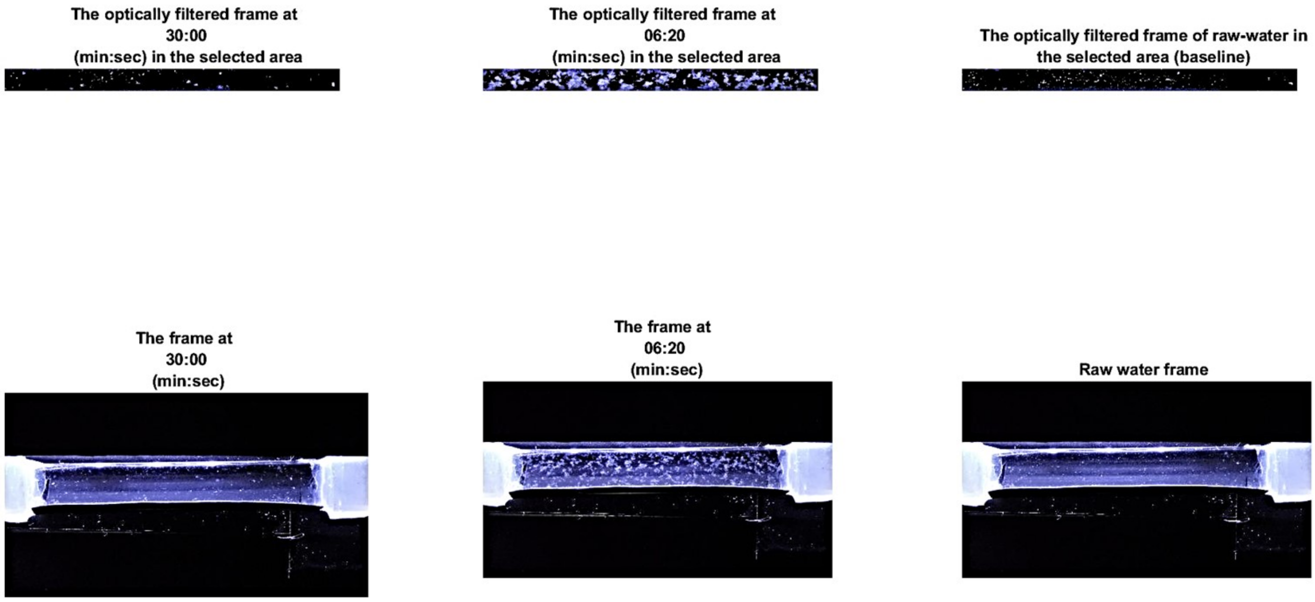


Fig. S1 (continue)

a3) Myponga River sample treated with *202 mg L^{-1}* alum

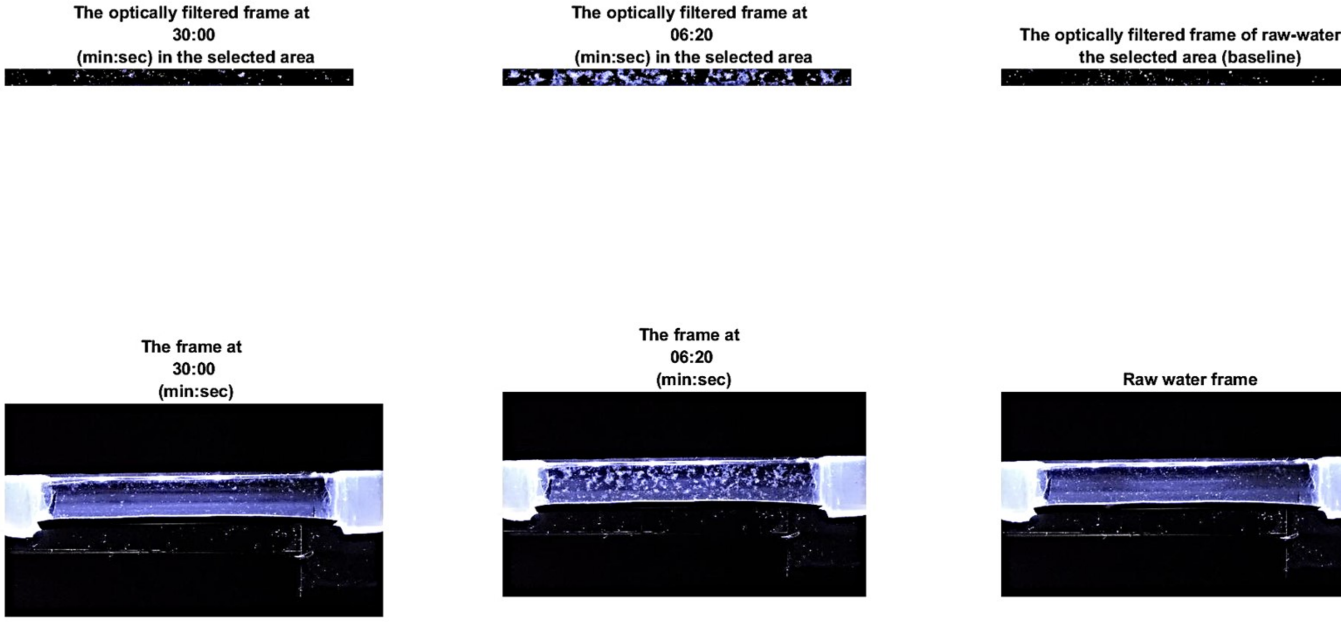


Fig. S1 (continue)

a4) Myponga River sample treated with *303 mg L^{-1}* alum

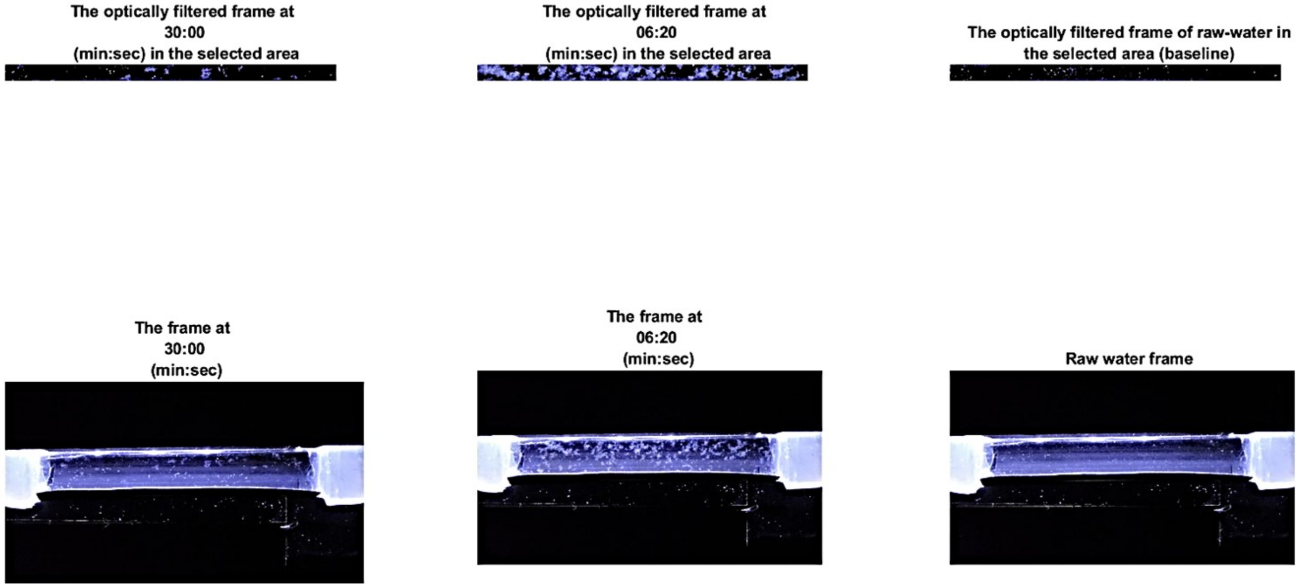


Fig. S1 (continue)

b1) Murray River sample treated with *26 mg L^{-1}* alum

Fig. S1 (continue)

b2) Murray River sample treated with *52 mg L^{-1}* alum

Fig. S1 (continue)

b3) Murray River sample treated with *104 mg L*$^{-1}$ alum

Fig. S1 (continue)

b4) Murray River sample treated with *156 mg L*$^{-1}$ alum

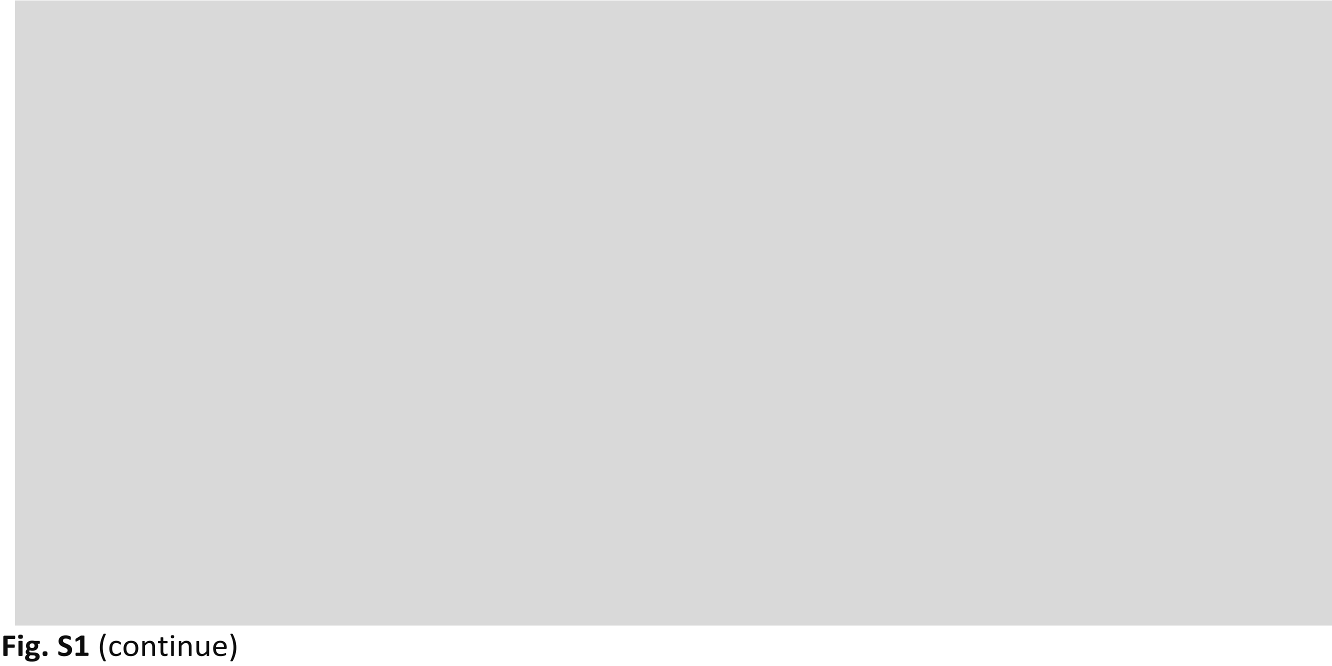


Fig. S1 (continue)

c1) Middle River sample treated with *51 mg L^{-1}* alum

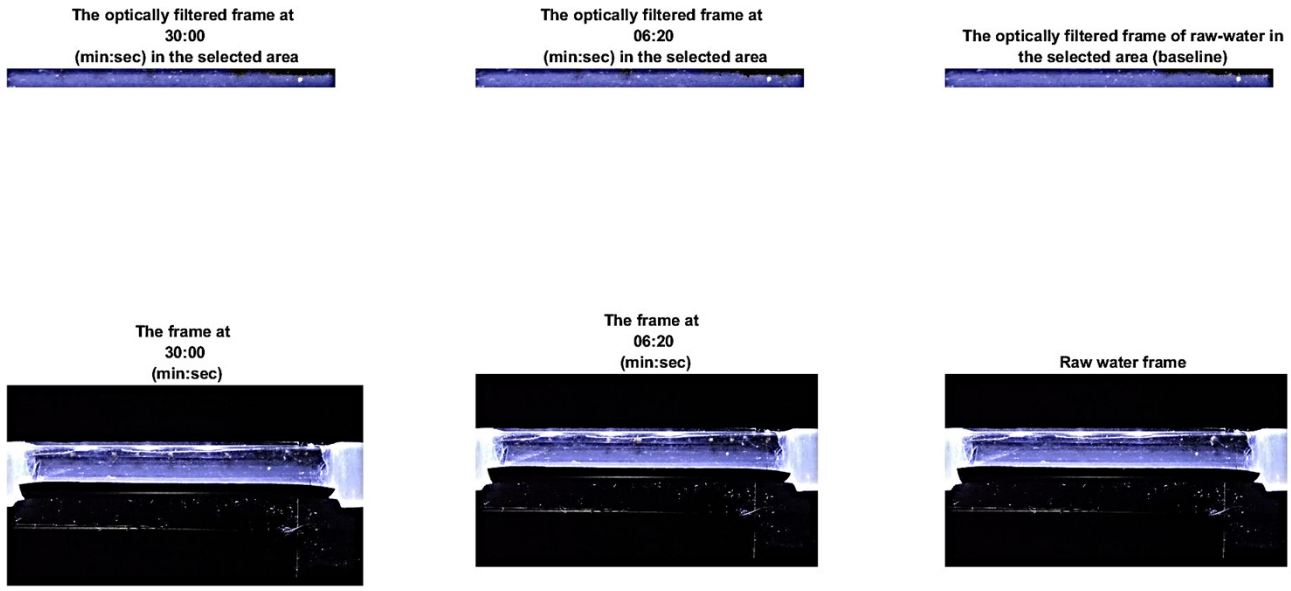


Fig. S1 (continue)

c2) Middle River sample treated with *202 mg L^{-1}* alum

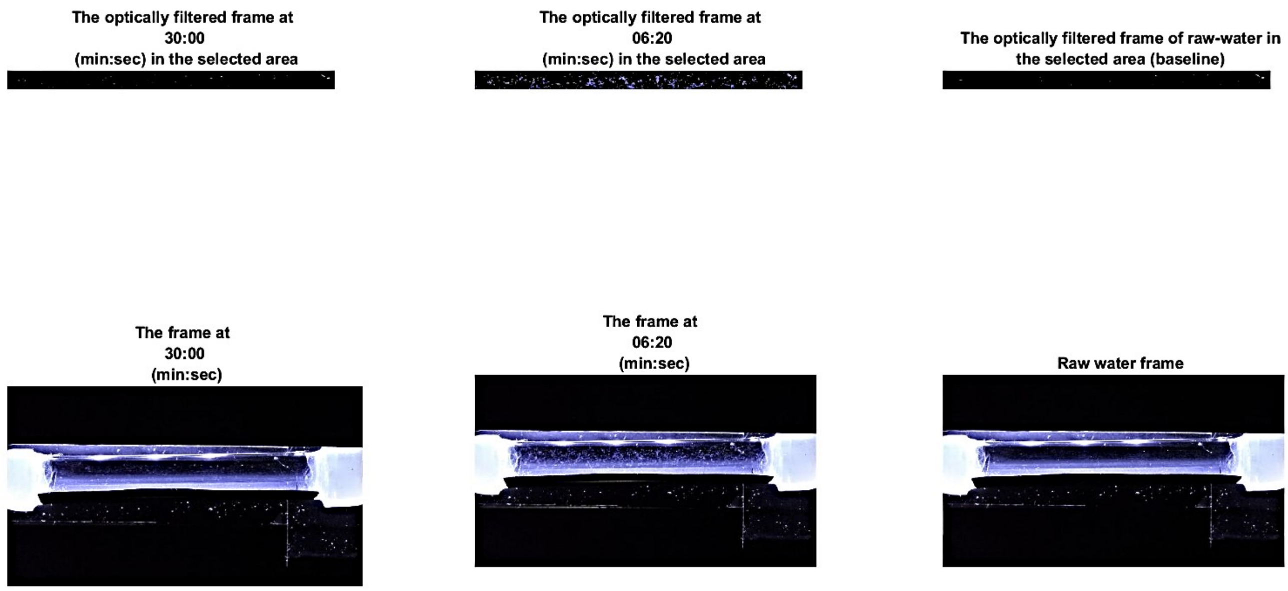


Fig. S1 (continue)

c3) Middle River sample treated with *303 mg* L^{-1} alum

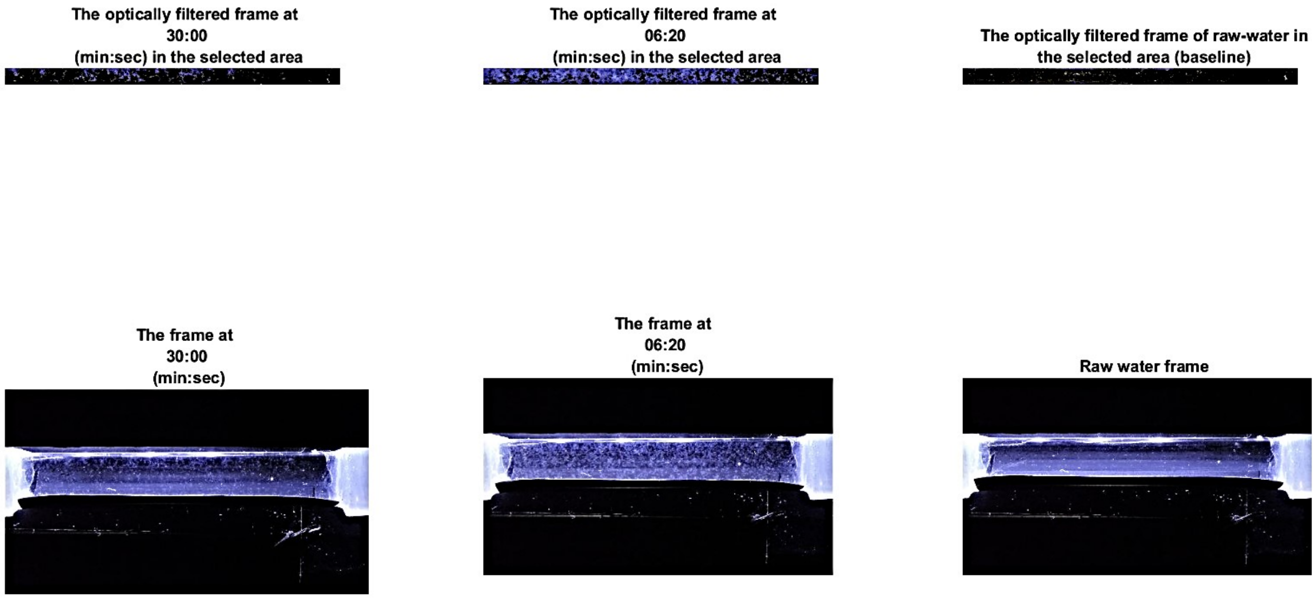
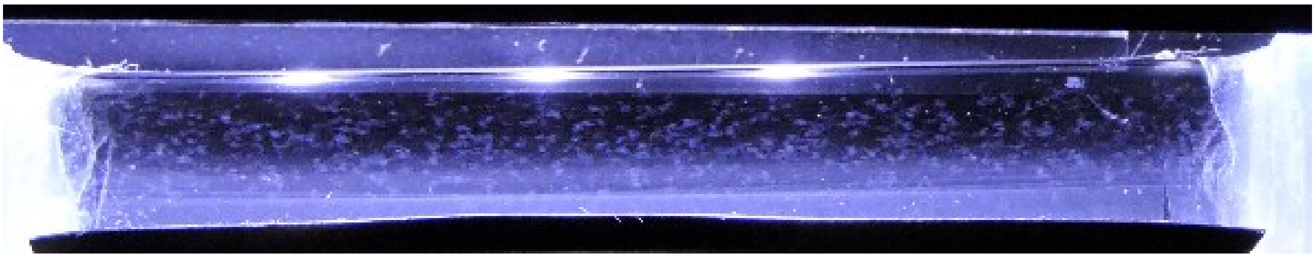


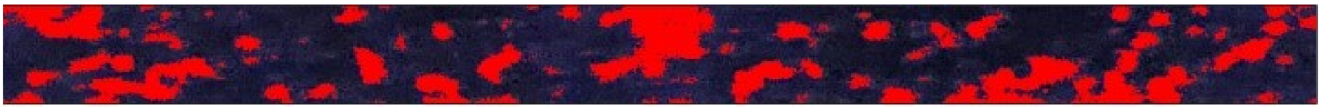
Fig. S1 (end)

c1) The *C-FIA* selected video frame for particle analysis



c2) Cropped C-FIA selected video frame with extraneous light removed

c3) The optical filteration view of the selected area before analysis



c4) Summary of results for image analysis of particles.

Summary.csv

File Edit Font

Slice	Count	Total Area	Average Size	%Area	Mean
1000660.jpg	219	13.943	0.064	24.118	70.495

Fig. S2 The floc particles size/number/density data attained by image analysis of a C-FIA selected video frame (at 10’ 00” process time) of Middle River (c) sample using ImageJ software. *The average size of the floc particles (in mm, and mm^2 for total area) was determined using the C-FIA photography cell length (60 mm length of the photographic area of the a1 and b1 photos) using the available function in ImageJ software. **The average RGB signal intensity for each distinguished particle termed as “Mean” in the summary results table of ImageJ is based on an arbitrary unit (a.u.) which can be an index for density or breakability of the formed flocs when other influencing factors like light intensity and radiation angle to the C-FIA cell is well fixed

Table S1 The results of the floc particles analyses using ImageJ software for all experiments

Sample	Alum dose	Count	Total area	Average size	%Area	Mean
Myponga River	51	96	6.8	0.071	23.5	97
	101	759	50.4	0.067	24.6	130
	202	1040	124.6	0.120	29.5	126
	303	452	32.7	0.072	15.6	167
Murray River	52	394	44.5	0.113	22.2	85
	104	537	52.2	0.097	18.8	103
Middle River	51	326	4.2	0.013	3.8	162
	202	219	13.9	0.064	24.1	71
	303	1252	55.6	0.044	41.0	117

Appendix 1

Reynolds number calculation for the flow path through the tubes (tubing with 3 mm internal diameter and photography cell with 3 mm × 9 mm cross section size) in these experiments:[1]

1- Reynolds number for tubing with 3 mm internal diameter

$Q = \sim 25$ mL min^{-1}
$\mu = \sim 0.6$ g cm^{-1} min^{-1}
$\rho = \sim 1$ g mL^{-1}
d = 3 mm (0.3 cm)

$A = \pi/4*d^2 = \pi/4*0.3^2 = 0.0707$ cm^2
$u = Q/A = 25/0.0707 = \sim 353.7$ cm/min
$Re = \rho\times u\times d/\mu = 1\times 353.7\times 0.3/0.6 = \sim 177$

2- Reynolds number for photography cell with 3 mm × 9 mm cross section size

$Q = \sim 25$ mL min^{-1}
$\mu = \sim 0.6$ g cm^{-1} min^{-1}
$\rho = \sim 1$ g mL^{-1}
width(w) * depth(d) = 0.9 cm * 0.3 cm
P= 2 * (w + d) = 2.4 cm

$A = w*d = 0.27$ cm^2
$d' = 4 * A / P = 0.45$
$u = Q/A = 25/0.27 = \sim 92.6$ cm/min
$Re = \rho\times u\times d'/\mu = 1\times 92.6\times 0.45/0.6 = \sim 70$

Re < 2300 can be considered as laminar flow.[1]

Reference

1. S. Klutz, S. K. Kurt, M. Lobedann and N. Kockmann, Narrow residence time distribution in tubular reactor concept for Reynolds number range of 10–100, Chemical Engineering Research and Design, 2015, **95**, 22-33.