

Figure S1. Schematic representation of automatic microscopy image acquisition system.

```
# call retrain.py

source ~/tensorflow/venv/bin/activate

cd ~/tensorflow/retrain

python retrain.py \
  --bottleneck_dir=tmp/bottlenecks \
  --how_many_training_steps=100 \
  --model_dir=tmp/inception \
  --summaries_dir=tmp/training_summaries/basic \
  --output_graph=output/retrained_graph.pb \
  --output_labels=output/retrained_labels.txt \
  --image_dir=test_data

# classify images

source ~/tensorflow/venv/bin/activate

cd ~/tensorflow/retrain

python label_image.py \
  --graph=output/retrained_graph.pb \
  --labels=output/retrained_labels.txt \
  --input_layer=Placeholder \
  --output_layer=final_result \
  --image=sample/Sample001.jpg
```

Figure S2. Command line used to retrain Inception v3 model and to classify images into one of two classes.

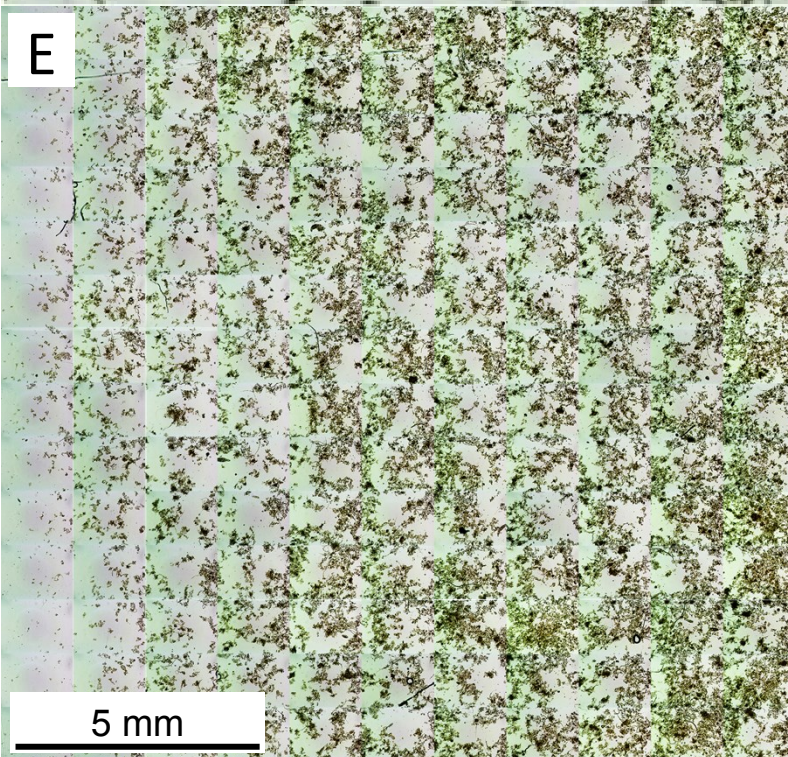
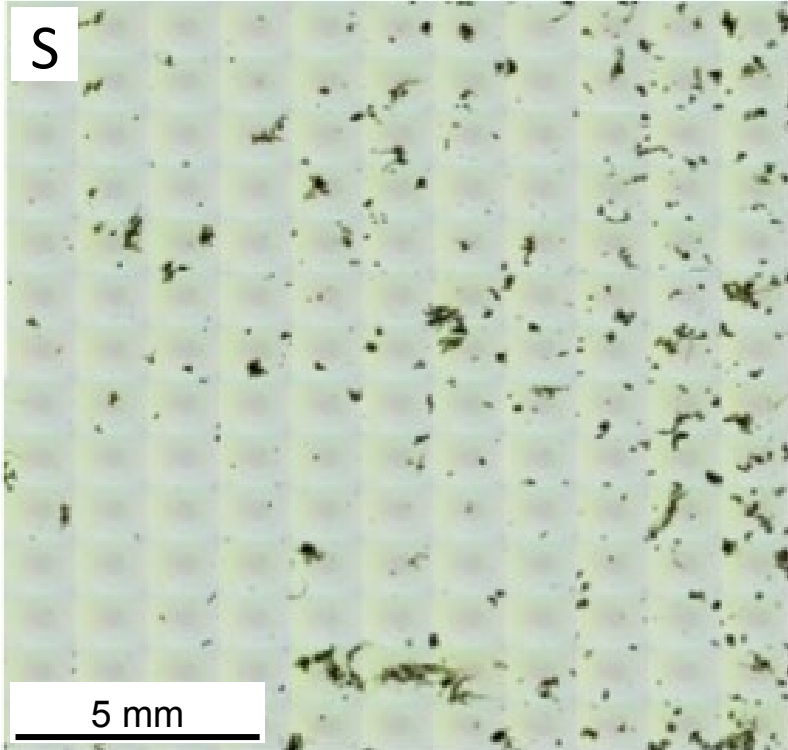


Figure S3. Typical microscopic images in bright field of AS flocs obtained from WWTP-S (S) and WWTP-E (E). A total of 154 were exhaustively acquired in a single slide and assembled. Small gaps between images were closed.

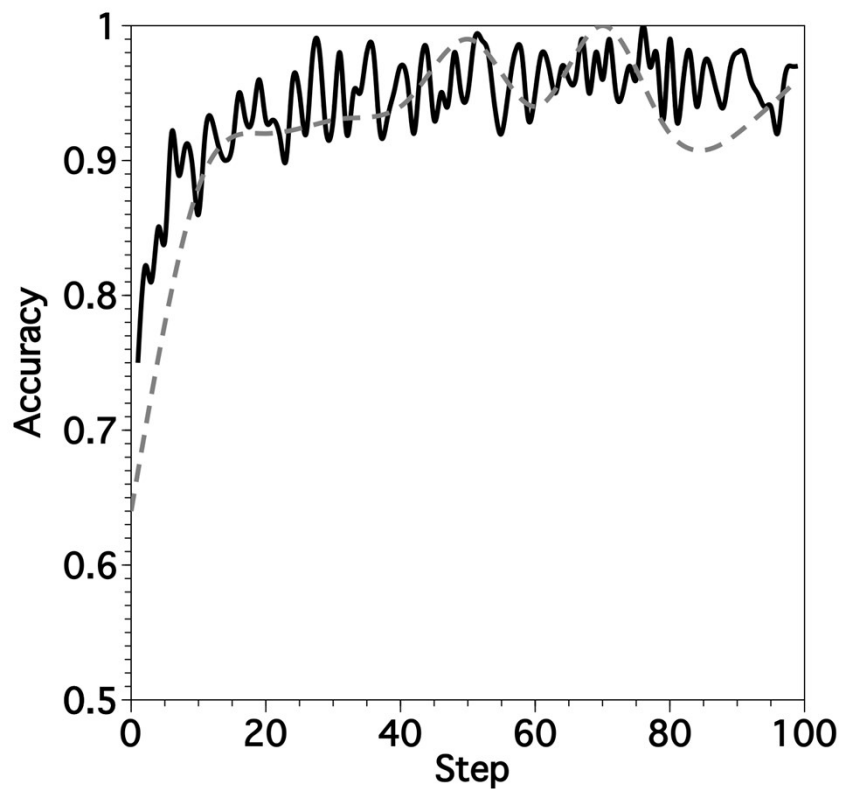


Figure S4. Training (solid line) and validation (dashed line) accuracy for Classifier-1 during 100 training steps.

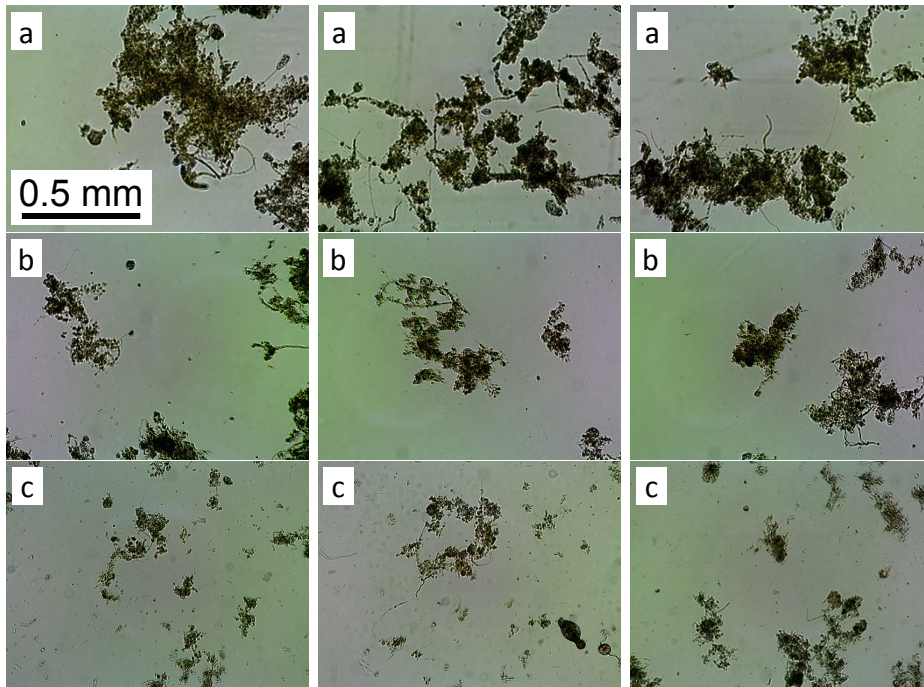


Figure S5 Typical microscopic images in bright field of AS flocs obtained from WWTP-S at (a) day 0, (b) day 1, and (c) day 2.

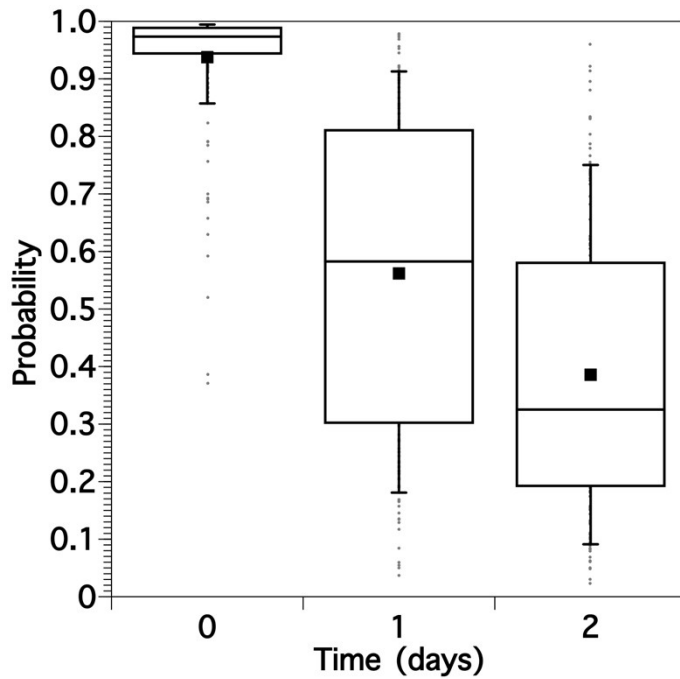


Figure S6. Boxplot of average probability scores of 154 images of AS flocs obtained from WWTP-S and cultivated in our laboratory with vigorous aeration. The rectangular box indicates the lower and upper quartiles and the median, the square plot indicates the average, and the whiskers indicate the 9th and 91st percentiles. All other results are plotted as outliers.

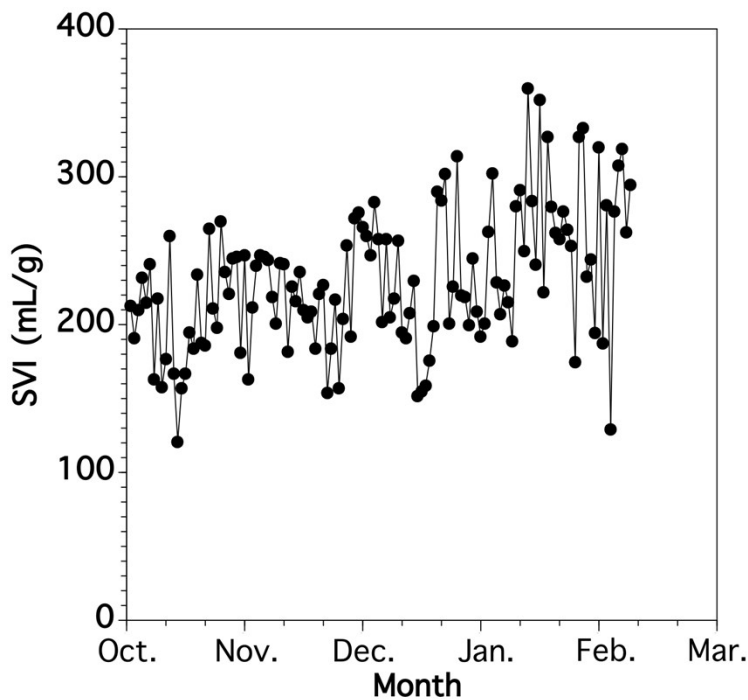


Figure S7. Time-course changes in SVI of AS of WWTP-M.

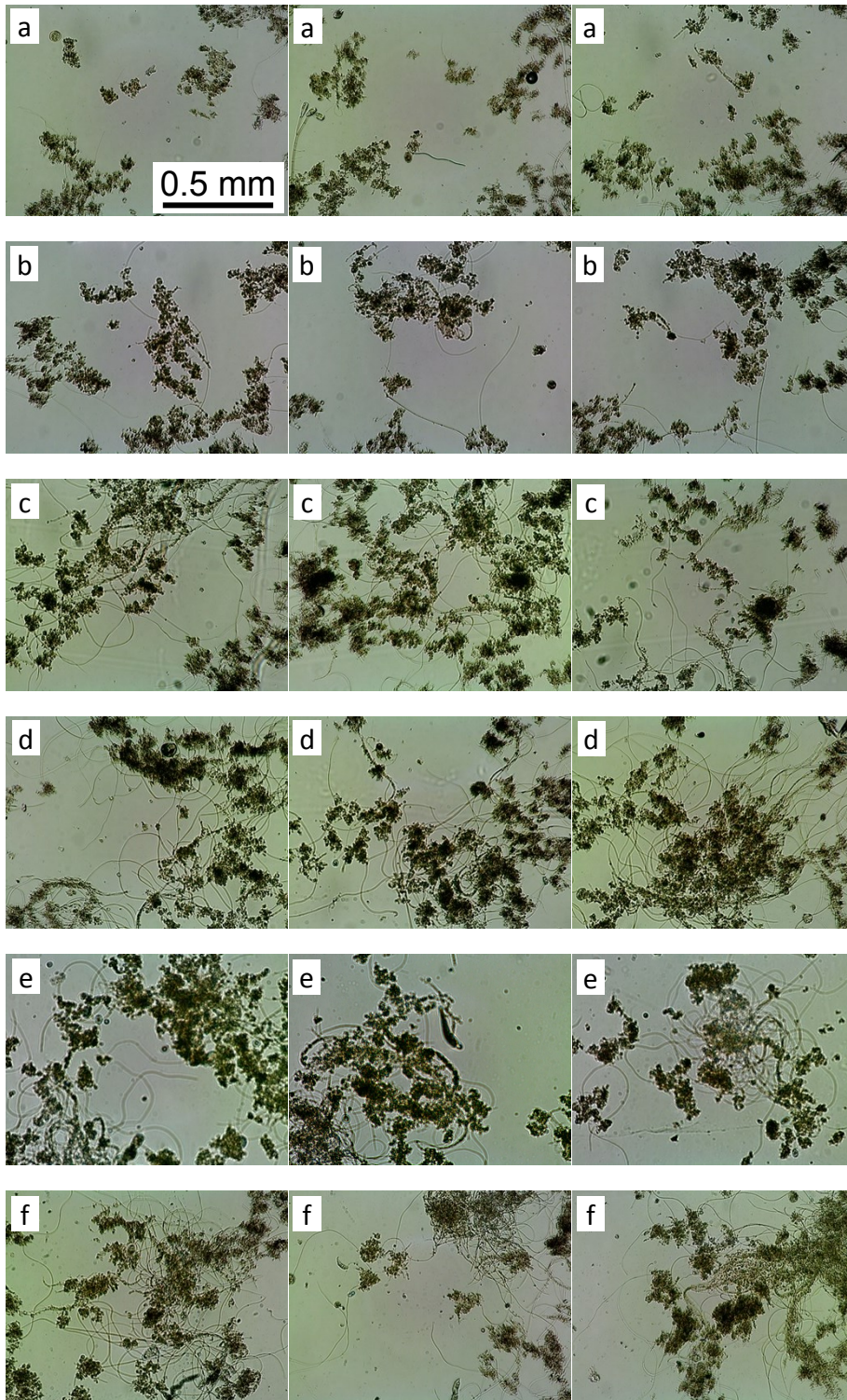


Figure S8. Typical microscopic images in bright field of AS flocs obtained from WWTP-M on (a) December 10th, (b) December 17th, (c) December 24th, (d) January 14th, (e) January 21st, and (f) January 28th.