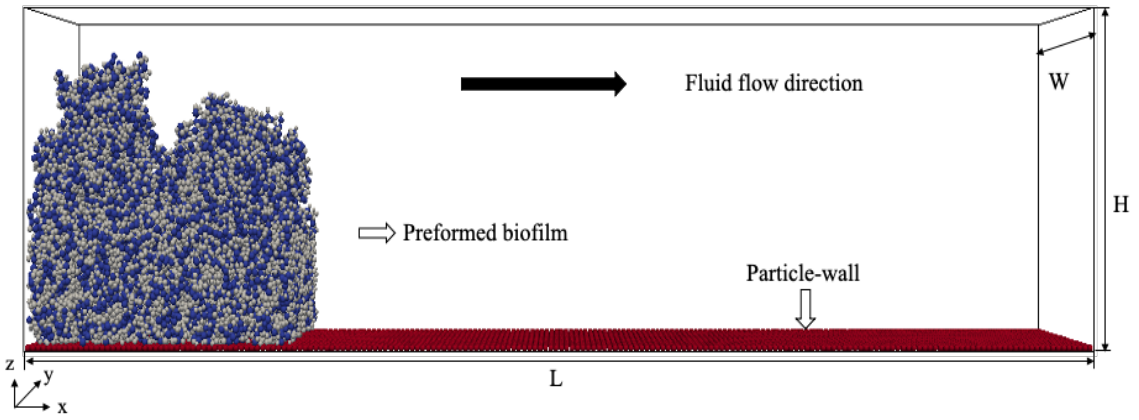

Figure 1. Representation of pre-grown biofilm (with 51% EPS) in the channel. Bacterial cells are represented by blue particles while the grey particles are EPS agents, and red particles are a layer of the growth surface wall.

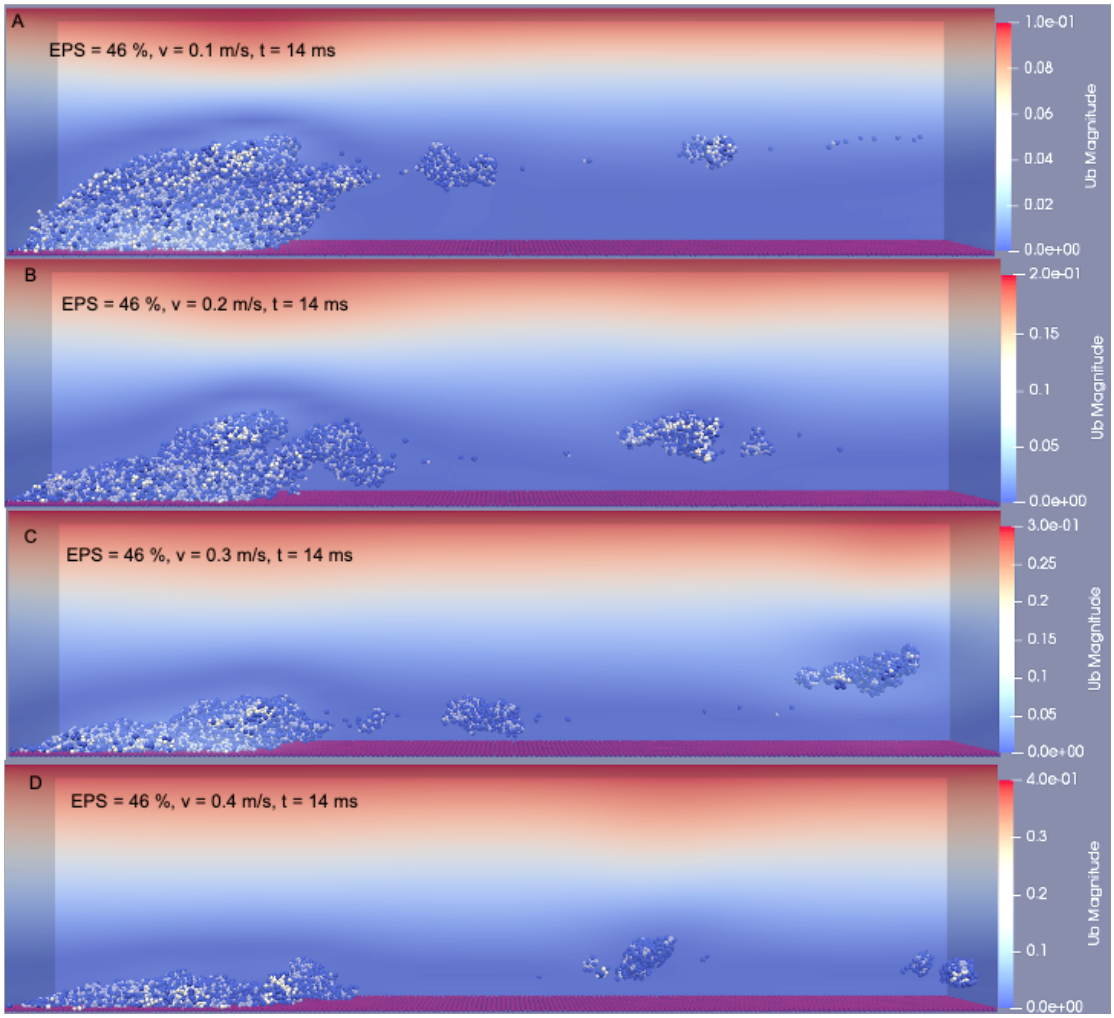

Figure 2. Biofilm deformation and detachment at inlet flow velocity in the range of 0.1 to 0.4m/s. t = 14 ms.

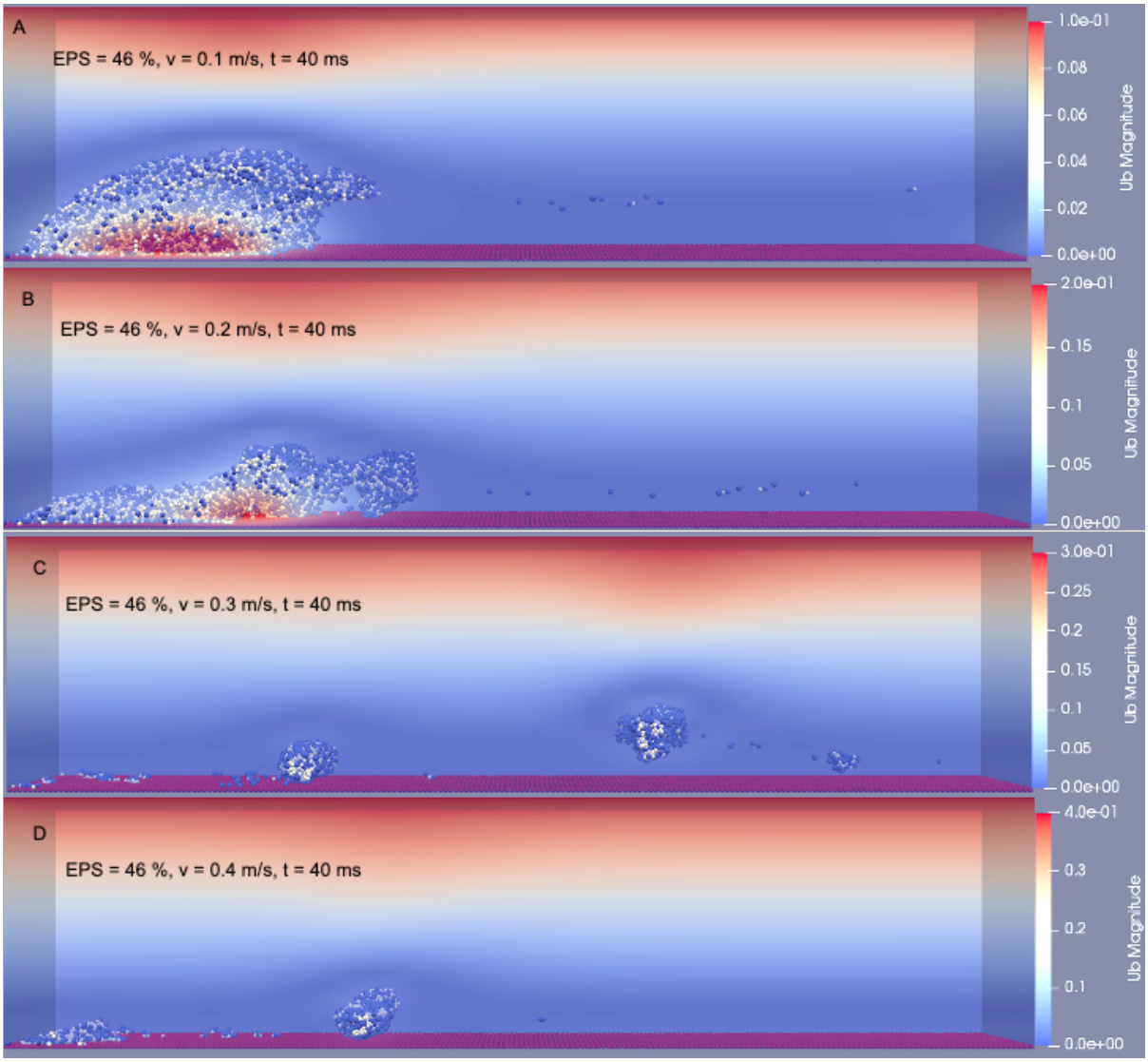

Figure 3. Biofilm deformation and detachment at inlet flow velocity in the range of 0.1 to 0.4m/s. t = 40 ms.

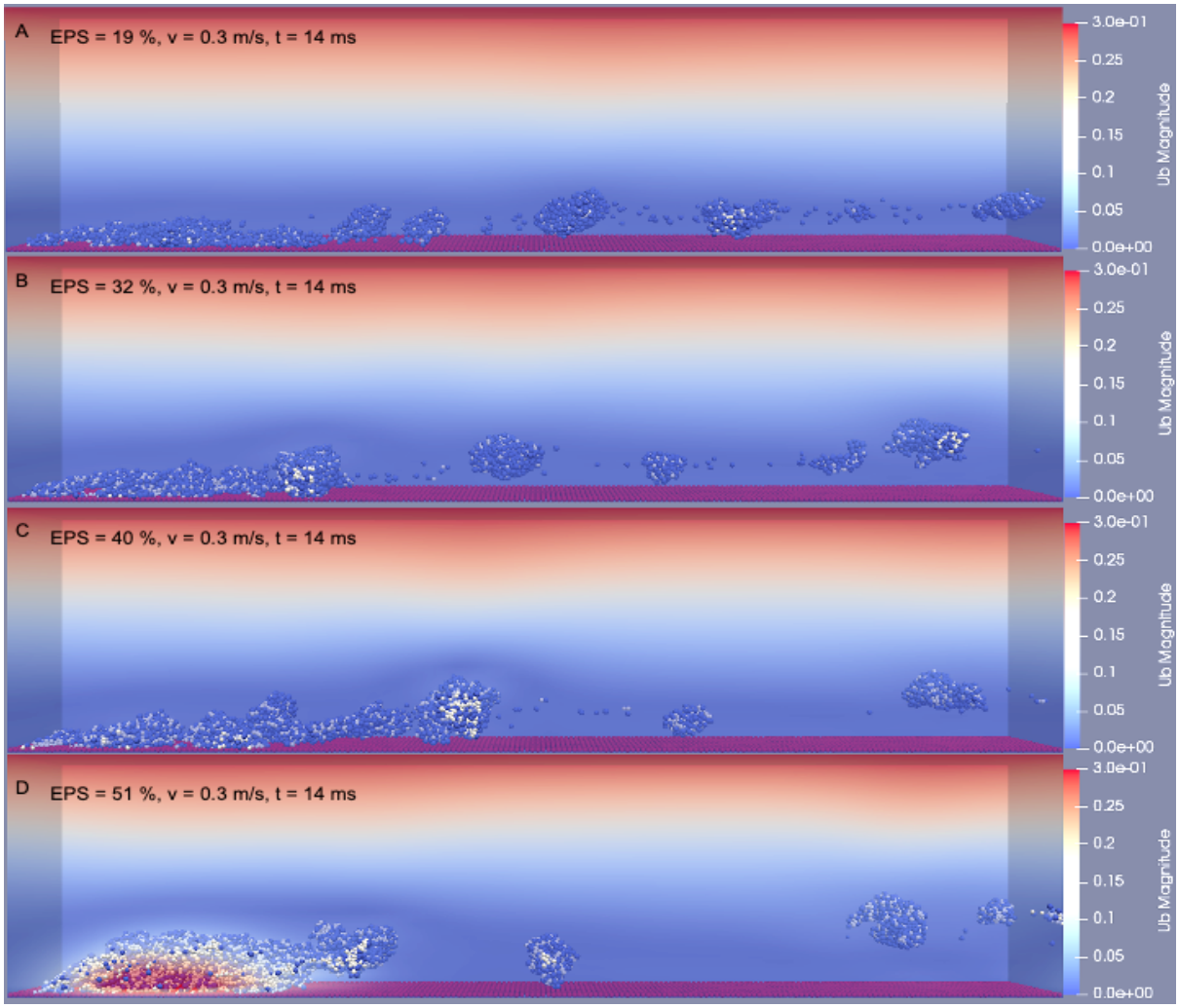

Figure 4. Biofilm deformation and detachment at time of 14 ms with the inlet fluid velocity of 0.3 m/s. The amount of EPS within the biofilm increased from (A) 20 %, (B) 32 %, (C) 40 % to (D) 51 %.

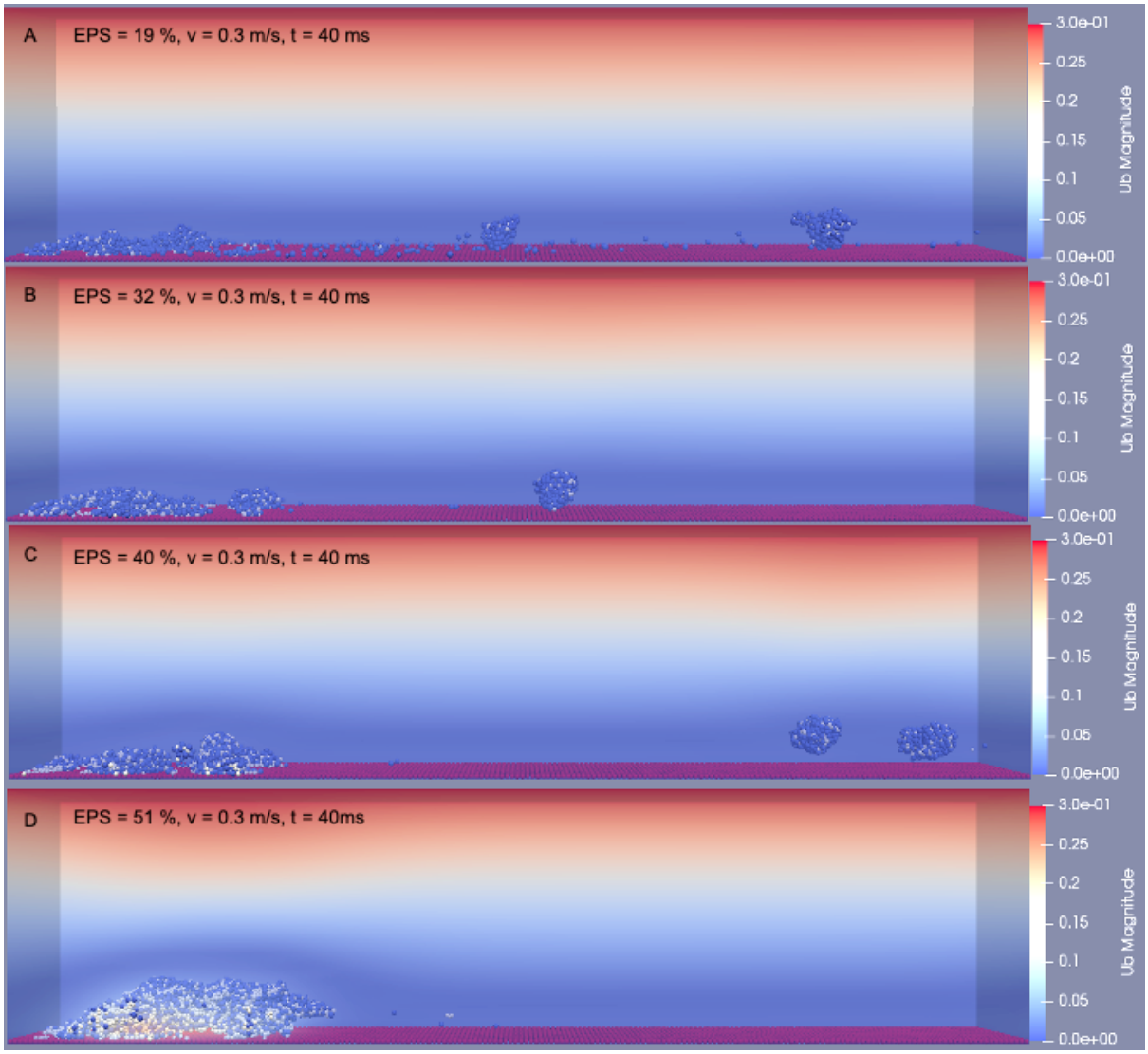

Figure 5. Biofilm deformation and detachment at time of 40 ms with the inlet fluid velocity of 0.3 m/s. The amount of EPS within the biofilm increased from (A) 20 %, (B) 32 %, (C) 40 % to (D) 51 %.

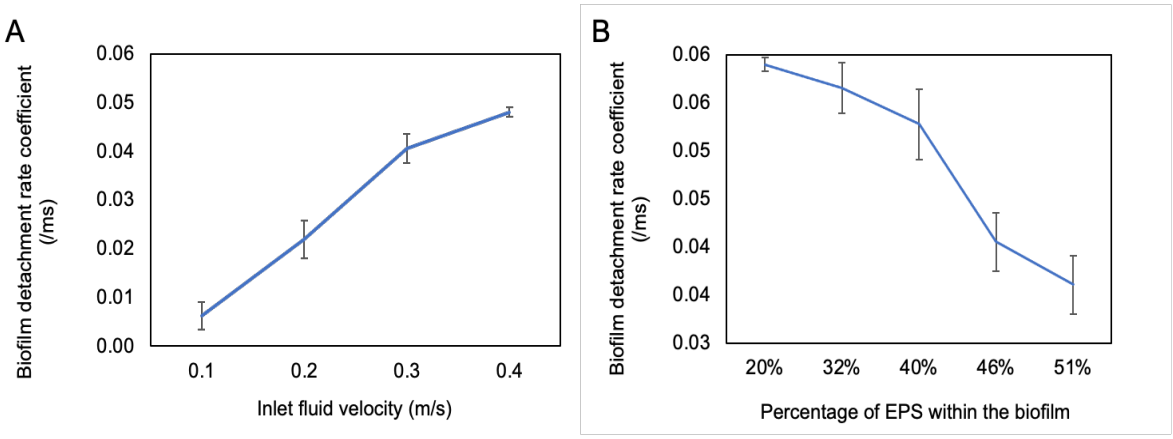

Figure 6. (A) The effect of fluid velocity on biofilm detachment rate coefficient for a typical biofilm with 46 % EPS. (B) The effect of EPS amount on biofilm detachment rate for a given inlet flow velocity of 0.3 m/s. The error bars show the standard deviation calculated from three replicated.

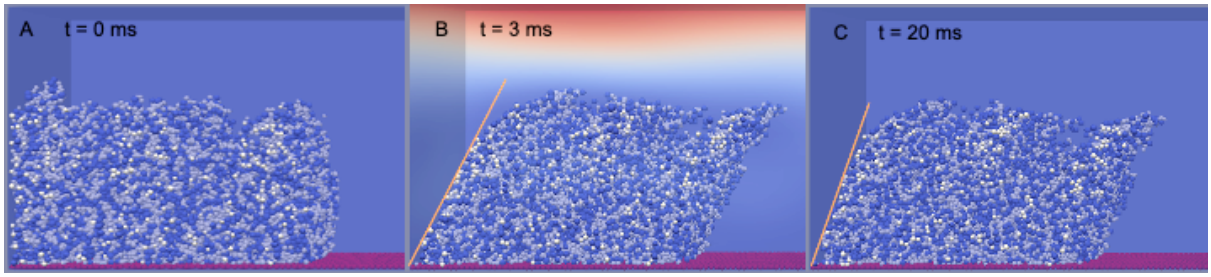

Figure 7. (A) The original shape of a biofilm with 46 % EPS, (B) maximum biofilm deformation in flow and (c) biofilm recovery 17ms after flow stopped.

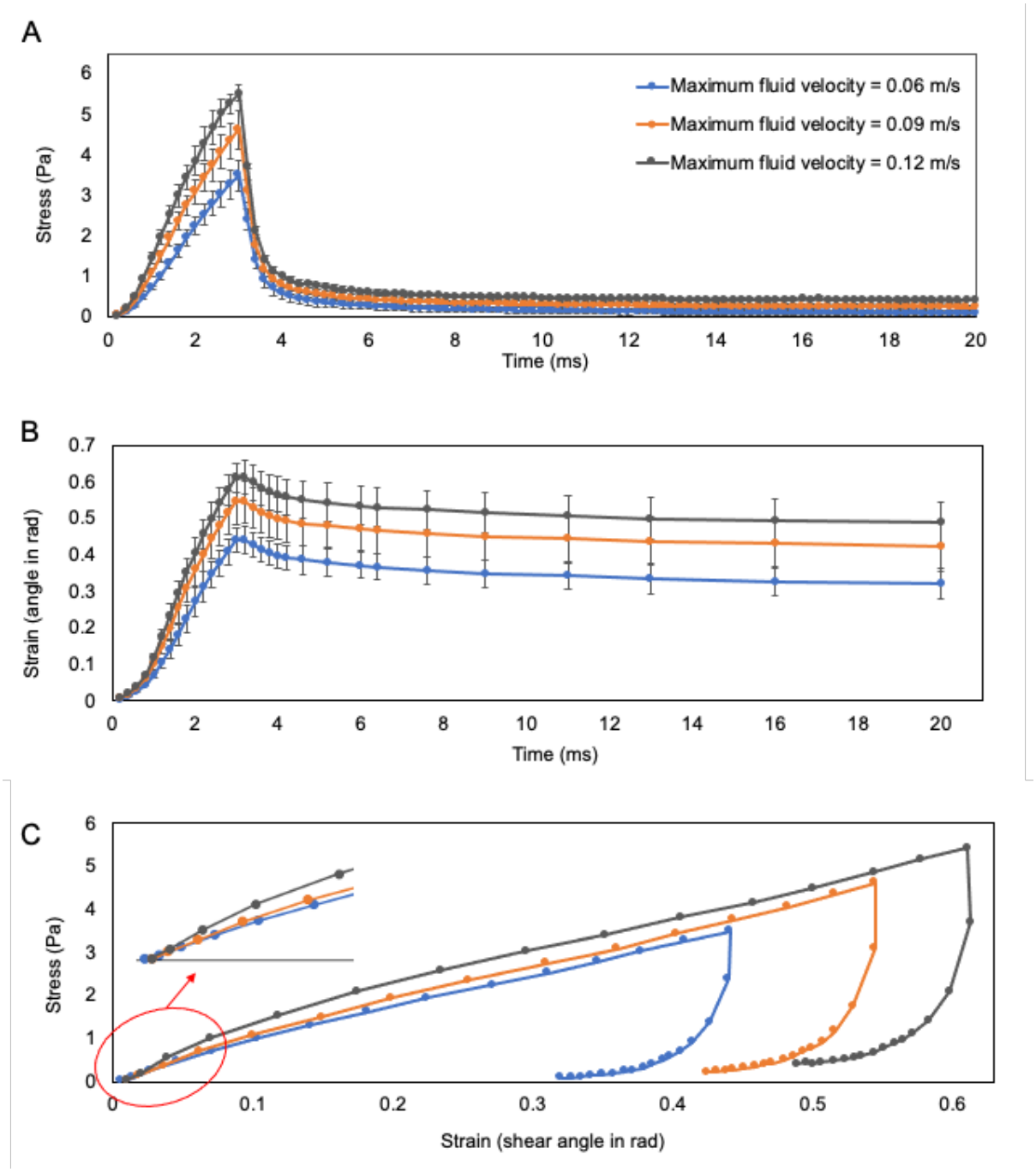

Figure 8. The fluid induced (A) stress and (B) strain on biofilms changed with time and the corresponding averaged (C) stress-strain curve (standard deviation did not give here for the high resolution). Where the flow was applied on the biofilm with 46 % EPS for 3 ms, accelerated at 20 m/s^2, 30 m/s^2 and 40 m/s^2, to reach the peak velocities of 0.06 m/s, 0.09 m/s and 0.12 m/s.

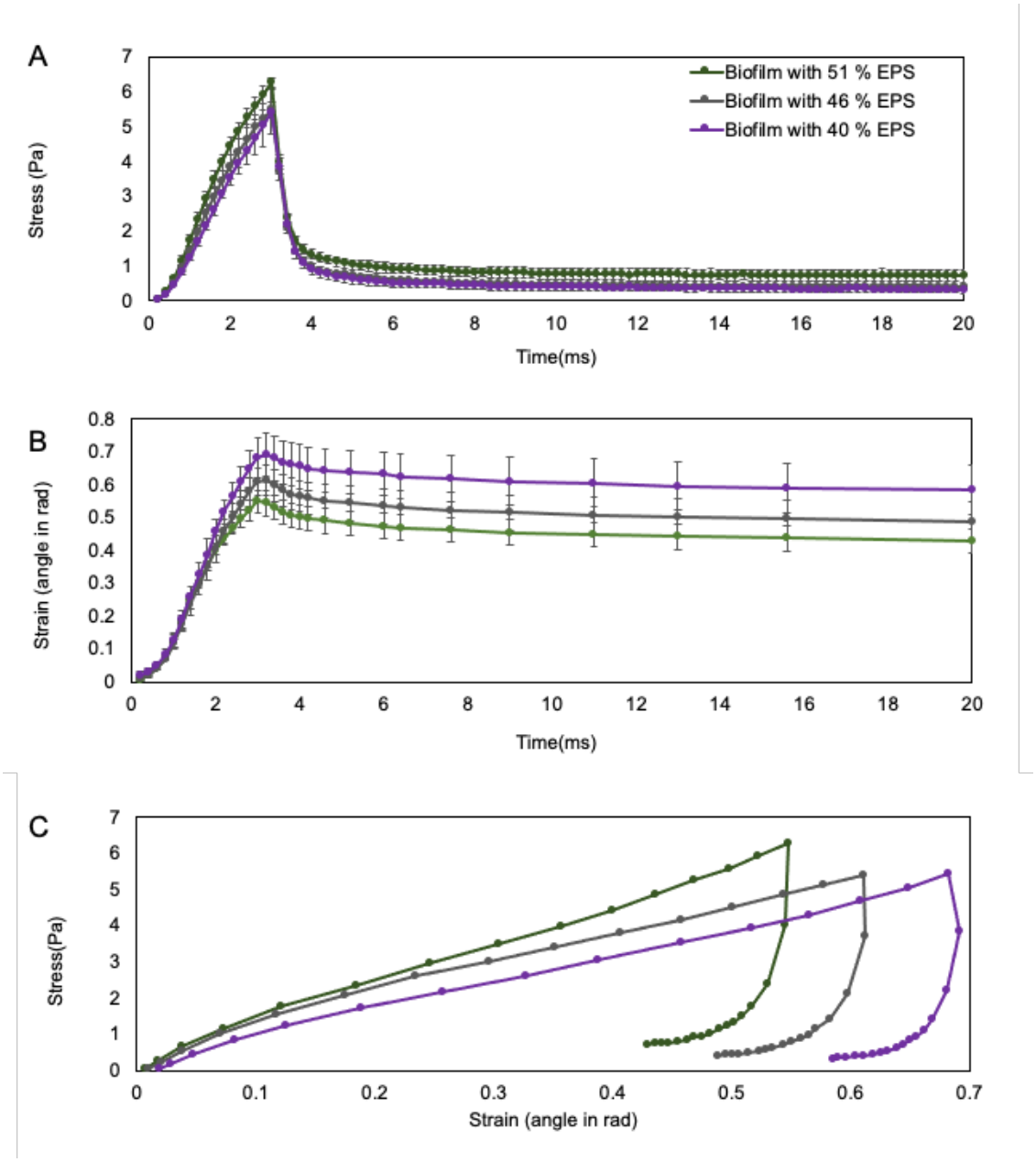

Figure 9. The fluid induced (A) stress and (B) strain on biofilms changed with time and the corresponding averaged (C) stress-strain curve when the flow was applied and terminated (standard deviation did not give here for the high resolution). The biofilms with 40 %, 46 % and 51 % EPS were selected. The fluid velocity was applied at an acceleration of 40 m/s^2.