How strongly do oysters stick?
Nicolas Morato Gutierrez, Andres M. Tibabuzo Perdomo, and Jonathan J. Wilker
Department of Chemistry, Universidad de los Andes
Department of Chemistry, Purdue University
School of Materials Engineering, Purdue University

ABSTRACT
Biological adhesives are a type of interfacial material that has incredible potential to generate new biomimetic compounds that can replace current strong, but toxic, adhesives. Therefore, a study of the chemical composition and mechanical properties of those bio-adhesives is necessary. However, in the case of oysters, despite known chemical characterization of the adult’s adhesive, there are almost no studies on its mechanical properties. Furthermore, there is no available information on the adhesive properties of spat (oysters in their larvae state). Herein, we present the first mechanical characterization of the spat adhesive, measuring its adhesion strength by hydrodynamic determination using a water jet. This study suggests that the adhesion strength of spat could be as high as 70 Pascals, but is highly dependent on experimental conditions. For instance, it was found that the adhesion strength increases on hydrophobic substrates with low surface energy, and that is also dependent on the environmental conditions, like the moisture level. Nevertheless, no relationship between the area of the larvae and its adhesion strength was found. Therefore, it can be proposed that a possible strong hydrophobic interaction adhesive-surface, or an enhancement of the adhesive production over low energy substrates is required for adhesive bonding. This would direct future studies on the search of the adhesion mechanism of this species and increase the biological knowledge about oyster larvae.

KEYWORDS
Adhesion strength, oyster, spat, adhesive, water jet, surfaces.