

Scientific Paper:

Appl. Sci. (2021), 11, 2049

Microfluidic Platform for Examination of Effect of Chewing Xylitol Gum on Salivary pH, O₂, and CO₂

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Abstract:

Miniaturization of different measurement processes and a scaled-down approach open the possibility for rapid measurements with the small amounts of samples and reagents into a compact platform with integrated sensors and different measuring components. In this paper, we report a microfluidic approach for measurements of salivary pH, dissolved O₂, and CO₂ during chewing xylitol gum. The Study was done with the samples of 30 healthy volunteers who were chewing a xylitol gum, and the measurements were performed in the microfluidic (MF) chip with integrated commercial PreSens sensors. Xylitol exhibited a significant effect on the pH of saliva in terms of its initial drop, which was the most significant between the 5th and 10th minutes. The effect of xylitol on the amount of oxygen and carbon dioxide in saliva cannot be confirmed. The employed microfluidic platform was shown to be applicable and effective in the analysis of salivary biomarkers relevant to caries development.

Keywords: microfluidics, saliva, pH, O₂, CO₂, xylitol, PMMA, xurography