

Oral presentation at 11th International Congress on Engineering and Food (ICEF) 2011, Athens, Greece  
from May 22 - 26

### **Controlled release of nisin from biopolymer films**

J. Chacko<sup>a</sup>, M. Lalpuria<sup>b</sup>, J.D. Floros<sup>b</sup>, R.C. Anantheswaran<sup>b</sup>

<sup>a</sup>General Mills Inc., Minneapolis, USA (jinochacko@generalmills.com)

<sup>b</sup>Department of Food Science, The Pennsylvania State University, University Park, USA

#### **ABSTRACT**

Nisin is a bacteriocin, approved as a food preservative. In food systems, nisin loses its antimicrobial activity over time because it binds to protein, fat etc. Controlling the overall rate of release of nisin into the food can partly overcome this problem. This research was undertaken to evaluate various biopolymer-based films for use in controlled-release of nisin into aqueous food systems. The objectives of this study were to investigate different biopolymers (locust bean gum (LBG), xanthan gum (XG), carrageenans (CG), alginates (AL), hydroxypropylmethyl cellulose (HPMC) and corn zein (CZ)) for nisin release and to study their antimicrobial activities. The antimicrobial activity of these nisin incorporated biopolymer films was evaluated by the agar diffusion method. XG and LBG films quickly dissolved on the agar surface without producing a distinguishable inhibition zone. Similarly, Kappa and iota CG films did not produce any inhibition zone. Blended films made with kappa CG and HPMC exhibited measureable nisin release and the inhibition zone increased with increasing HPMC concentration in the film. AL and CZ film formed clear inhibition zones. For AL films, the inhibition zone decreased with increasing crosslinking time, % CaCl<sub>2</sub> and % guluronic acid. The amount of nisin released from CZ films was quantified using a high performance liquid chromatographic (HPLC) technique and a Weibull model was fitted to the data. Nisin release decreases as concentration of corn zein in the film matrix increases. Films made with HPMC, AL and CZ showed promise for developing controlled release applications with nisin in aqueous food systems.

Keywords: controlled release; nisin; corn zein; alginate