**Exopolysaccharides-pigment complex from liquid fermentation of *Monascus* purpureus (Hong Qu): structural and functional relationships**

Qingbin Guo1,2,3, Steve W. Cui4 , Nifei Wang1,2, Zhenjing Li1,2, Changlu Wang1,2, N.V. Nepovinnykh5 and H. Douglas Goff3

*1School of Food Engineering and Biological Technology, Tianjin University of Science & Technology, Tianjin, 300222, China.*

*2State Key Laboratory of Food Nutrition and Safety, School of Food Engineering and Biotechnology, Tianjin University of Science and Technology, Tianjin, 300457, P.R.China*

*3Department of Food Science, University of Guelph, Guelph, Ontario N1G 2W1 Canada 4Guelph Research and Development Centre, Agriculture and Agri-Food Canada, Guelph, Ontario N1G 5C9 Canada*

*5Department of Food Technology, Federal State Budgetary Educational Institution of Higher Education Saratov State Agrarian University, Teatralnaya square, 1, 410012, Saratov, Russia*

As a traditional Chinese medicinal and edible fungus, *Monascus* has been widely studied for its secondary metabolites *Monascus* pigments, while its other metabolites such as exopolysaccharides have rarely been reported. In this study, exopolysaccharides from liquid fermentation of *Monascus* purpureus (Hong Qu) were purified using DEAE-Cellulose column chromatography. Their rheological and film-forming properties were studied. A novel pigment covalently linked exopolysaccharides complex was firstly identified. The molecular structural features of the complex including polysaccharides portion, the linkage position as well as the distribution of pigment molecule along the polysaccharides chain were systematically investigated using the combining techniques of methylation analysis, 1D & 2D NMR and LC-MS. Furthermore, through molecular modification, complex molecules bearing various percentages of conjugated pigments were successfully obtained. According to which, the impacts of pigments on the functional properties of the complex has been well established; An enhanced stability of the pigments under the exopolysaccharides-pigment complex structure also has been proved.