

## Evaluation of Gelatin/Carboxymethylcellulose Scaffolds by Using Mooney-Rivlin Model

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### Abstract

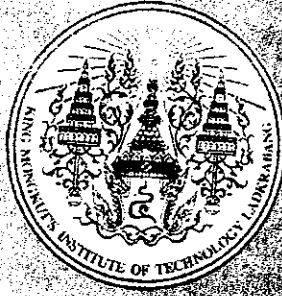
Scaffolds based on various ratios of gelatin blended with carboxymethylcellulose (CMC) were studied. The scaffolds were fabricated to porous structure via freeze drying process and crosslinked to induce conjugation of free amide and carboxyl groups in protein structures by using thermal crosslinking techniques. The mechanical properties of the scaffolds were characterized both experimental procedure and modeling. In order to evaluate the modeling, the stress-strain behavior of the scaffolds by fitting the data to a Mooney-Rivlin model was described. We utilized the Mooney-Rivlin constitutive relationship for soft networks which typically express nonlinear behavior of stress-strain curve from compression test. Results showed that the data distribution of both model and experiment are in the same trend. The models which evaluated CMC blended gelatin scaffold in the ratio of 80 and 20 of gelatin and CMC occurred in the highest average in shear modulus which was 18.12 kPa, compared to other blended scaffolds. Gelatin scaffold blending with 10, 30 and 40% of CMC showed dramatically decreased in the shear modulus which were 7.70, 3.10 and 1.53 kPa, respectively, compared to pure gelatin scaffold with significant difference. These results showed the possibility of using CMC as a low cost material to combine with biopolymers for using in tissue engineering applications.

**Keywords:** Gelatin, Carboxymethylcellulose, Shear modulus, Hyperelastic material, Mooney-Rivlin model

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**ABSTRACTS AND PROGRAM**

**December 11-13, 2014  
Chumphon, Thailand**

*organized by*

**King Mongkut's Institute of Technology Ladkrabang  
Thailand**

Day 2 - December 12, 2014 At Novotel Chumphon Beach Resort and Golf

Time	Program	
	<b>Oral session III</b>	
	<b>Room 1 Chairperson:</b> Dr. Kamonwan Chucheeep	<b>Room 2 Chairperson:</b> Dr. Vorapat Sanguanchaipaiwong
15.30 - 15.50	Microwave-assisted Synthesis of Porous Sol-gel Derived SnO <sub>2</sub> Nanoparticles Templated by H <sub>2</sub> O <sub>2</sub> -Treated Egg Shell Membrane Natural Fibers  by Assoc. Prof. Dr. Wisanu Pecharapa	Microwave Pretreatment for Lipase Retardation in Rice Bran  by Vanapron Sae-ang
15.55 - 16.15	Evaluation of Gelatin/Carboxymethylcellulose Scaffolds by using Mooney-Rivlin Model  by Fasai Wiwatwongwana	The SEIR Dynamical Model of Dengue Disease with the Effect of New Infected Vectors  by Pratchaya Chanprasopchai
16.20 - 16.40		Bioactivities and Antifungal Potential of Actinomycete Isolated from the Rhizosphere of Aromatic Medicinal Plant <i>Coleus zeylanicus</i>  by P. R. Ragi
16.40 - 18.00	Poster session	
18.30 - 20.30	Award of best poster presentation and announcement of the host for the 13 <sup>th</sup> ISBB, Closing ceremony and Dinner	

Day 3 - December 13, 2014

Time	Program
	Optional trips