

## Energy Dissipation and Mullins Effect of Tough Polymer/Graphene Oxide Hybrid Nanocomposite Hydrogels

Ziqing Tang<sup>1, #</sup>, Feng Chen<sup>1, #</sup>, Qiang Chen<sup>1\*</sup>, Lin Zhu<sup>1</sup>, Xiaoqiang Yan<sup>1</sup>, Hong Chen<sup>2</sup>,  
Baiping Ren<sup>2</sup>, Jia Yang<sup>1</sup>, Gang Qin<sup>1</sup>, and Jie Zheng<sup>2\*</sup>

<sup>1</sup>School of Materials Science and Engineering  
Henan Polytechnic University, Jiaozuo, China, 454003

<sup>2</sup>Department of Chemical and Biomolecular Engineering  
The University of Akron, Akron, Ohio, USA, 44325

# Equivalent contribution

\* Corresponding Author: [qiangcheneric@163.com](mailto:qiangcheneric@163.com) and [zhengj@uakron.edu](mailto:zhengj@uakron.edu)

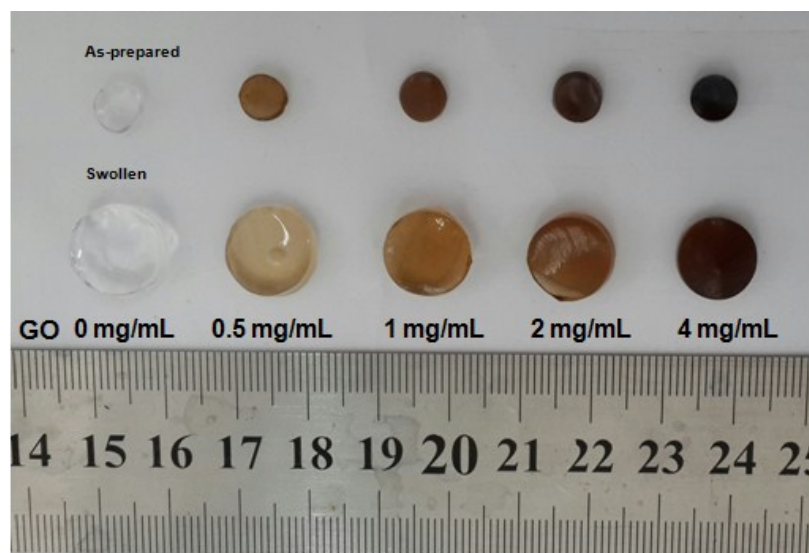


Figure S1. Swelling of PAAm/GO NC gels with various GO concentrations.

Table S1. Effect of MBA concentration on the tensile properties of PAAm/GO NC gels

MBA (mol%)	$E$ (kPa)	$\sigma_f$ (MPa)	$\epsilon_f$ (mm/mm)	$W$ (MJ/m <sup>3</sup> )
0.01	49.70	0.01	6.84	0.60
0.03	46.16	0.23	11.94	1.92
0.05	61.94	0.27	12.21	2.32
0.07	65.88	0.27	13.76	2.51
0.1	93.32	0.19	4.28	0.71

Table S2. Effect on strain rate on the tensile properties of PAAm/GO NC gels.

Strain rate ( $s^{-1}$ )	$E$ (kPa)	$\sigma_f$ (MPa)	$\epsilon_f$ (mm/mm)	$W$ (MJ/m <sup>3</sup> )
0.006	72.16	0.18	12.23	1.49
0.036	70.79	0.24	15.87	2.48
0.060	67.56	0.27	17.58	2.99
0.129	65.88	0.27	13.76	2.51
0.244	45.96	0.24	14.79	2.34