DOPING PCL SCAFFOLDS WITH NOVEL JNK INHIBITORS TO IMPART ANTI-INFLAMMATORY PROPERTIES

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Compounds with 11H-indeno[1,2-b]quinoxalin-11-one scaffold – **IQ–1** and **IQ–1E** (Fig. 1) were recently identified and characterized as potent C-Jun N-terminal kinase (JNK) inhibitors [1]. JNKs play important role in the pathogenesis of numerous diseases including rheumatoid arthritis, insulin resistance, cancer, Alzheimer's, and Parkinson's diseases [2, 3]. In particular, they regulate pro-inflammatory cytokine secretion and signaling cascades that lead to inflammation and disfunction [4]. Therefore, JNKs are attractive targets for the treatment of cytokine driven diseases.

However, poor solubility in water and organic solvents affects bioavailability of **IQ–1** and **IQ–1E** and limits their application. In order to solve this issue, we fabricated poly(ε-caprolactone)-based scaffolds doped with **IQ–1** (PCL-IQ-1) and **IQ–1E** (PCL-IQ-1E) via electrospinning using 1,1,1,3,3,3-hexafluoro-2-propanol as a common solvent [5].

All scaffolds were characterized by micron-sized fibers with unimodal diameter distribution and smooth surface. The release of compounds from fabricated scaffolds into the aqueous medium was investigated. The release profile had two steps: burst release due to compound desorption from the surface, followed by sustained release attributed to diffusion into the medium. Commonly used kinetic models were applied to describe the release of **IQ–1** and **IQ–1E** from scaffolds (Table 1). The Higuchi equation was used to calculate the release rate constants (k_H), as this model best described the experimental data. Using the Ritger-Peppas model [exponent value (n)], we determined that compound release was controlled by diffusion and swelling, in the case of **IQ–1**, and only by Fickian diffusion, in the case of **IQ–1E** [5].

Being incorporated in PCL scaffold, **IQ–1** and **IQ–1E** saved the ability to inhibit inflammatory responses. For instance, obtained scaffolds could suppress human neutrophil activation and inhibit inflammatory cytokine production by MonoMac-6 cells. Overall, the obtained results demonstrated that PCL scaffolds doped with JNK inhibitors **IQ–1** and **IQ–1E** could be a promising drug delivery system that could find application in the treatment of inflammatory diseases.

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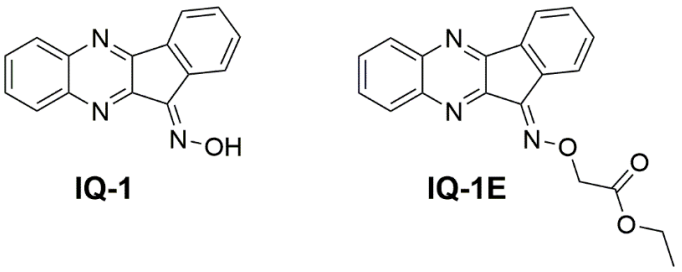

Fig. 1. *Structures of JNK inhibitors:* 11H-indeno[1,2-b]quinoxalin-11-one oxime (***IQ-1***), 11H-indeno[1,2-b]quinoxalin-11-one O-(O-ethylcarboxymethyl) oxime (***IQ-1E***)

Table 1. Values of regression coefficients (R^2) for the kinetic models applied to describe the release of the **IQ–1** and **IQ–1E** from the fabricated scaffolds

Mathematical model	Zero-order	First-order	Higuchi model	Ritger-Peppas model
Equation [5]	$f=k_0 t$	$f=1-e^{-k_1 t}$	$f=k_H t^{0.5}$	$f=k_p t^n$
PCL-IQ-1	0.8963	0.9132	0.9921 ($k_H=1.38$)	0.9002 ($n=0.53$)
PCL-IQ-1E	0.9494	0.9870	0.9953 ($k_H=3.91$)	0.9464 ($n=0.31$)

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DIAZONIUM-FUNCTIONALIZED LASER-IRRADIATED GRAPHENE AS A MATERIAL FOR FLEXIBLE AND WEARABLE ELECTRONICS

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Graphene and carbon nanostructures are widely spread nowadays for the use in electronic devices fabrication. However, graphene itself could be strained to use for the aims of flexible electronics and the Internet of Things due to the poor dispersibility in solvents (except the toxic ones) and its bad reinforcement to polymers. In this regard, a material capable to overcome these issues is one of the graphene derivatives – graphene oxide (GO). GO forms stable water and ethanolic suspensions and is convenient to be used in water-processable deposition techniques on arbitrary substrates. Multiple ways, which are globally divided into thermal and

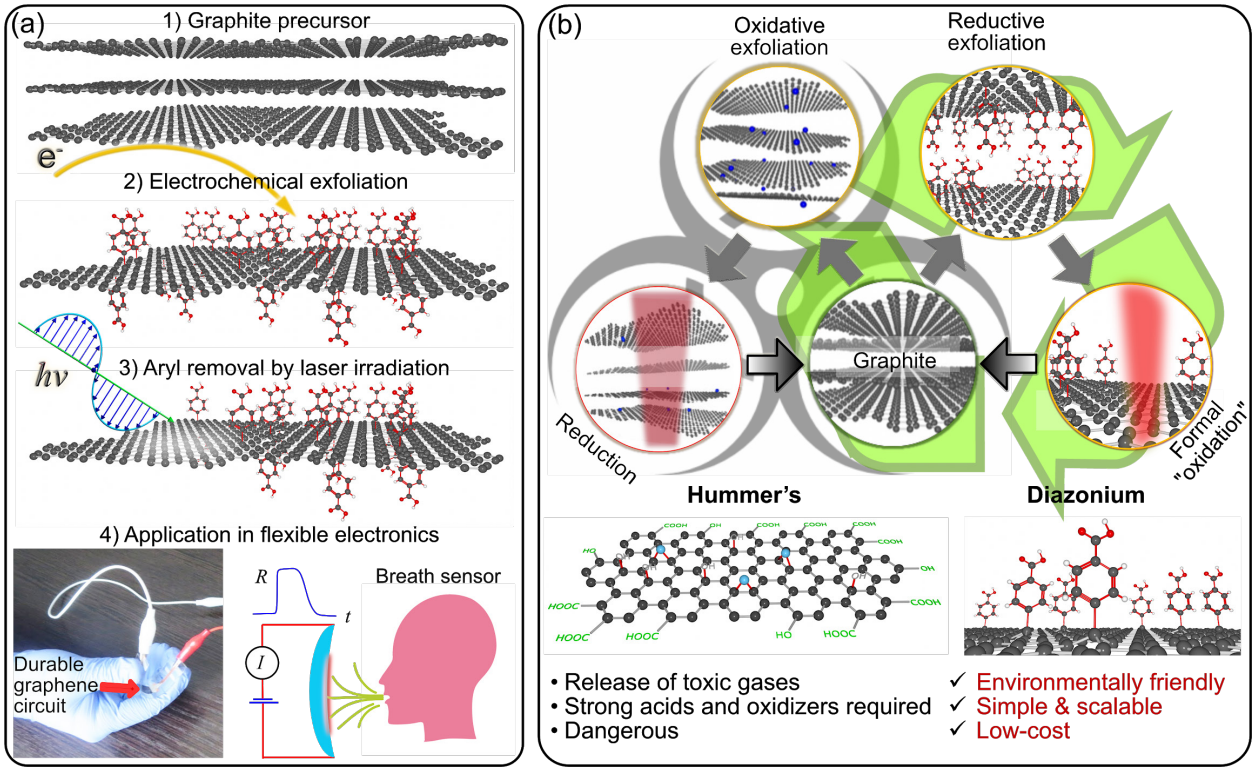

Fig. 1.