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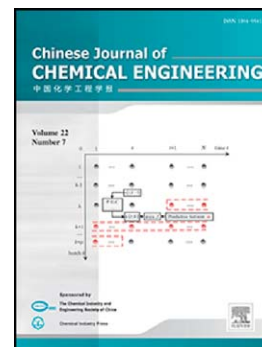
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Catalysis, Kinetics and Reaction Engineering

## Glycerol Carbonate Synthesis from Glycerol and Dimethyl Carbonate using Guanidine Ionic Liquids\*

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**Abstract** A large number of surplus glycerol from the biodiesel production can be used as renewable feedstock to produce glycerol carbonate. In this paper, a series of guanidine-based ionic liquids were synthesized to catalyze the transesterification of glycerol and dimethyl carbonate. The tunable basicity and the anion-cation cooperative effect were responsible for the obtained results. The [TMG][TFE] showed the best activity (TOF of 1754.0 h<sup>-1</sup>, GL conversion of 91.8%, GC selectivity of 95.5%) at 80 °C with 0.1 mol% catalyst for 30 min. The reaction mechanism of the transesterification was also proposed.

**Keywords** guanidine-based ionic liquids, glycerol carbonate, transesterification

### 1 INTRODUCTION

Glycerol carbonate (GC), originally from biomass, is a kind of high value-added chemicals in industry [1]. GC can be used for the synthesis of various chemical intermediates due to its hydroxyl group and 2-oxo-1,3-dioxolane group [2–4]. It is also used in the field of cosmetics, coating and paints because of its non-flammable, non-volatile and biodegradable properties [5]. The GC production is regarded as a promising way to deal with the huge excess of glycerol from biodiesel industry [6–9].

GC can be synthesized from glycerol (GL) *via* several routes including phosgenation, transesterification with dimethyl carbonate (DMC) [6,10–14], carbonation with CO<sub>2</sub> [15–17], glycerolysis with urea [18,19] and so on. The phosgenation is limited by the toxicity of phosgene and the carbonation is restricted by

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