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Permeability enhancement of coal by chemical-free fracturing using high-voltage electrohydraulic discharge

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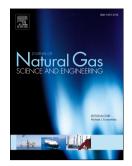
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ACCEPTED MANUSCRIPT

1	Permeability enhancement of coal by chemical-free fracturing using high-voltage
2	electrohydraulic discharge
3	Fei Ren ^{a,b} , Lei Ge ^{a,c} , Thomas E. Rufford ^a , Huilin Xing ^b , Victor Rudolph ^{a,*}
4 5 7 8 9 10	 a. School of Chemical Engineering, The University of Queensland, St Lucia 4072 Australia b. School of Earth and Environmental Sciences, The University of Queensland, St Lucia 4072 Australia c. Centre for Future Materials, University of Southern Queensland, Springfield Central, Queensland 4300, Australia * Corresponding author: v.rudolph@uq.edu.au Highlights
12 13	• A novel stimulation technique, namely high-voltage electrohydraulic discharge (EHD) has been developed and validated for coal cracking.
14	• Electrohydraulic discharge shows a great potential to create additional flow paths and
15	permeability in coal.
16	• Shockwaves generated by EHD increase the accessible porosity of the coal,
17	predominantly in the meso- and micropore size range.
18	• The banding in coal has a significant influence on breakage and fractures are more
19	likely to occur in weak plies rather than in the soft dull coal.
20	Abstract
21	Fractures, cleats or cracks provide the main fluid pathways for methane extraction from
22	Coalbed Methane (CBM) gas reservoirs. For deep coal seams, where the cleats are often
23	closed by the high overburden pressure, or some shallower but tight coals, fracturing
24	operations to form new pathways or clean out existing but blocked natural cracks are

25 necessary, for CBM wells to produce commercially attractive gas rates. This is usually done

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