

## PATENT ASSIGNMENT COVER SHEET

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<b>SUBMISSION TYPE:</b>	NEW ASSIGNMENT
<b>NATURE OF CONVEYANCE:</b>	ASSIGNMENT
<b>CONVEYING PARTY DATA</b>	
<b>Name</b>	<b>Execution Date</b>
PETER KELEMEN	09/28/2014
HEATHER SAVAGE	09/28/2014
THEODORE A. KOCZYNSKI	09/28/2014
<b>RECEIVING PARTY DATA</b>	
<b>Name:</b>	THE TRUSTEES OF COLUMBIA UNIVERSITY IN THE CITY OF NEW YORK
<b>Street Address:</b>	412 LOW MEMORIAL LIBRARY
<b>Internal Address:</b>	535 WEST 116TH STREET
<b>City:</b>	NEW YORK
<b>State/Country:</b>	NEW YORK
<b>Postal Code:</b>	10027
<b>PROPERTY NUMBERS Total: 1</b>	
<b>Property Type</b>	<b>Number</b>
<b>PCT Number:</b>	US2013038622
<b>CORRESPONDENCE DATA</b>	
<b>Fax Number:</b>	(203)782-2889
<i>Correspondence will be sent to the e-mail address first; if that is unsuccessful, it will be sent using a fax number, if provided; if that is unsuccessful, it will be sent via US Mail.</i>	
<b>Phone:</b>	203-498-4447
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<b>Correspondent Name:</b>	WIGGIN AND DANA LLP ATTN: PATENT DOCKET
<b>Address Line 1:</b>	ONE CENTURY TOWER
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<b>Address Line 4:</b>	NEW HAVEN, CONNECTICUT 06508-1832
<b>ATTORNEY DOCKET NUMBER:</b>	103470-201
<b>NAME OF SUBMITTER:</b>	ANTHONY P. GANGEMI
<b>SIGNATURE:</b>	/Anthony P. Gangemi/
<b>DATE SIGNED:</b>	09/30/2014
<b>Total Attachments: 3</b>	
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**ASSIGNMENT**

WHEREAS, We, Peter Kelemen, residing at 2 Nichols Drive, Hastings on Hudson, NY 10706, Heather Savage, residing at 411 Cedar Avenue, Nyack, NY 10960, and Theodore A. Koczynski, residing at 239 Birchwood Avenue, Upper Nyack, NY 10960, have invented certain new and useful improvements in METHODS AND SYSTEMS FOR CAUSING REACTION DRIVEN CRACKING IN SUBSURFACE ROCK FORMATIONS ("the Invention") for which we:

- ☐ have executed or authorized the execution of an application for Letters Patent of the United States of even date herewith;
- ☒ have filed or authorized the filing of an application for Letters Patent of the United States on April 29, 2013 under Serial No. PCT/US2013/038622; and

WHEREAS, We believe that we are the original inventor or an original joint inventor of a claimed invention in the application and hereby acknowledge that any willful false statement made in this document is punishable under 18 U.S.C. 1001 by fine or imprisonment of not more than five (5) years, or both;

WHEREAS, The Trustees of Columbia University in the City of New York, organized under the laws of the State of New York, having its principal place of business at 412 Low Memorial Library, 535 West 116<sup>th</sup> Street, New York, NY 10027, is desirous of obtaining the entire right, title, and interest in, to and under the said improvements and the said application;

NOW, THEREFORE, for good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged, we have sold, assigned, transferred and set over, and by these presents do hereby sell, assign, transfer and set over, unto the said The Trustees of Columbia University in the City of New York, its successors, legal representatives, and assigns the entire right, title, and interest in, to and under the said Invention entitled METHODS AND SYSTEMS

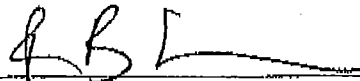
FOR CAUSING REACTION DRIVEN CRACKING IN SUBSURFACE ROCK FORMATIONS and any and all improvements thereto, and in and to the said application and any division, continuation, continuation-in-part thereof or renewal thereof, and in and to any and all Letters Patent of the United States which may be issued on any said applications thereon, claim priority therefrom, and any and all reissues, re-exams and extensions thereof, and in and to any and all applications for Letters Patent filed in any country or countries foreign to the United States for the said Invention or improvements, including all priority rights, and any and all Letters Patent which may be granted in any country or countries foreign to the United States therefor, and in and to any other applications based in whole or in part on any of the foregoing; and we hereby authorize and request the Commissioner of Patents of the United States and any Official of any country or countries foreign to the United States, whose duty it is to issue patents on applications as aforesaid, to issue all Letters Patent for said improvement to the said The Trustees of Columbia University in the City of New York, its successors, legal representatives and assigns, in accordance with the terms of this instrument.

AND WE HEREBY represent, warrant and covenant that we have the full right and power to make this assignment and that the rights, titles, and interests assigned are not encumbered by any agent, license, or right heretofore given and that we have not executed, and will not execute, any agreement in conflict herewith.

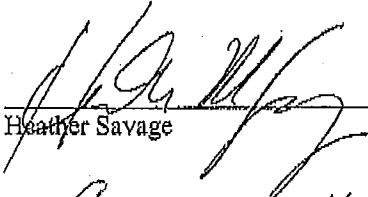
AND WE HEREBY further represent, warrant, covenant and agree that we will communicate to said The Trustees of Columbia University in the City of New York, its successors, legal representatives and assigns, any facts known to us respecting the said Invention and any and all improvements thereto, and testify in any legal proceeding, sign all lawful papers, execute all divisional, continuing and reissue applications, make all rightful oaths, and generally do everything possible to aid said The Trustees of Columbia University in the City of New York, its successors, legal representatives and assigns to obtain and enforce proper patent protection for said improvements in all countries.

IN TESTIMONY WHEREOF, We hereunto set our hands and seals the day and year set  
opposite our signatures.

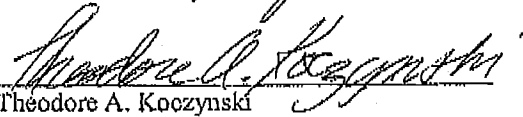
Date: 9/28/14

  
Peter Kelemen

Date: 9/28/14

  
Heather Savage

Date: 28 Sept. 2014

  
Theodore A. Koczynski

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