

Yenny Campos

Search history

Search 1: TAC=(LIQUID-IMPREGNATED SURFACES) (Results 6)

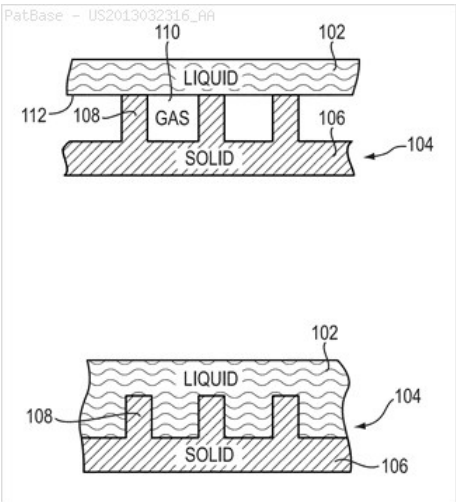
Search 2: [SP]: 1. an article comprising a liquid-impregnated surface, said surface comprising a plurality of micro-scale and/or nano-scale solid features spaced sufficiently close to stably contain an impregnating liquid therebetween, said surface stably containing said impregnating liquid between said solid features, wherein said impregnating liquid fills the volume between said solid features, wherein said impregnating liquid is held in place between said plurality of features regardless of orientation of said surface, wherein $0f0.5$, where f is the surface area fraction of said surface non-submerged by said impregnating liquid, and wherein said surface is a textured surface and said solid features are engineered protrusions of said textured surface. 2. the article of claim 1, wherein said impregnating liquid has viscosity at room temperature no greater than about 1000 cp. 3. the article of claim 1, wherein said impregnating liquid has vapor pressure at room temperature no greater than about 20 mm hg. 4. the article of claim 2, wherein said impregnating liquid has a viscosity at room temperature on the order of 10 cst or less. 5. the article of claim 1, wherein the plurality of solid features has a feature-to-feature spacing from about 1 micrometer to about 100 micrometers. 6. the article of claim 1, wherein the plurality of solid features has a feature-to-feature spacing from about 5 nanometers to about 1 micrometer. 7. the article of claim 1, wherein the plurality of solid features comprises hierarchical structures. 8. the article of claim 7, wherein the hierarchical structures are micro-scale features that comprise nano-scale features thereupon. 9. the article of claim 1, wherein the solid features have height no greater than about 100 micrometers. 10. the article of claim 1, wherein the solid features comprise at least one member selected from the group consisting of a spherical particle, a nanoneedle, a nanoglass, and a random geometry feature that provides surface roughness. 11. the article of claim 1, wherein the impregnating liquid comprises a member selected from the group consisting of silicone oil, a perfluorocarbon liquid, a perfluorofluorinated vacuum oil, a fluorinated coolant, an ionic liquid, a fluorinated ionic liquid that is immiscible with water, a silicone oil comprising pdms, a fluorinated silicone oil, a liquid metal, an eletro-rheological fluid, a magneto-rheological fluid, a ferrofluid, a dielectric liquid, a hydrocarbon liquid, a fluorocarbon liquid, a refrigerant, a vacuum oil, a phase-change material, a semi-liquid, grease, synovial fluid, bodily fluid. 12. the article of claim 1, wherein the article is a part of or coating of a pipeline, and wherein the liquid-impregnated surface inhibits the formation of hydrate thereupon and/or enhances the slippage of fluid flowing thereupon. 13. the article of claim 1, wherein the liquid-impregnated surface inhibits corrosion. 14. the article of claim 1, wherein the liquid-impregnated surface is an anti-fouling surface that resists adsorption of debris thereupon. 15. the article of claim 1, wherein $0f70.25$. 16. the article of claim 1, wherein said impregnating liquid is held in place within said plurality of solid features regardless of contact of said liquid-impregnated surface with a liquid different from said impregnating liquid. 17. the article of claim 1, wherein the plurality of micro-scale and/or nano-scale solid features comprises randomly-spaced features. 18. the article of claim 1, wherein the plurality of micro-scale and/or nano-scale solid features are evenly spaced. (Results 50)

Title: **LIQUID-IMPREGNATED SURFACES**, METHODS OF MAKING, AND DEVICES INCORPORATING THE SAME

Abstract: Source: US2013032316A The invention is directed to an article with a **liquid-impregnated** surface, the surface having a matrix of features thereupon, spaced sufficiently close to stably contain a liquid therebetween or therewithin, and preferable also a thin film thereupon. The surface provides the article with advantageous non-wetting properties. Compared to previous non-wetting surfaces, which include a gas (e.g., air) entrained within surface textures, these **liquid-impregnated surfaces** are resistant to impalement and frost formation, and are therefore more robust.

Classifications:

International (IPC 8-9): A61L27/00 B08B B08B17/06 B32B1/00 B32B33/00 B32B5/18 B60J1/02 B64D15/00 C04B111/20 C09D5/16 C09K3/18 C10M107/38 C10M107/50 F01D25/00 F01D5/28 F02C7/00 F02F1/00 F02F1/20 F02F3/00 F03D11/00 F16L9/14 F16L9/18 F28F13/18 G02B1/00 (Advanced/Invention); C04B111/20 (Advanced/Non-invention); B08B (Subclass/Invention) **CPC:** B08B17/065 C09D5/1681 F28F19/006 B64D15/06 Y10T428/24355 Y10T428/24372 **US:** 123/193.6 138/145 165/133 244/134E 296/96.14 359/507 428/141 428/143



Family:

Publication number	Publication date	Application number	Application date
AU2011374899 AA	20130214	AU20110374899	20111122
CA2844301 AA	20140205	CA20112844301	20111122
CL2014000292 A1	20140926	CL20140000292	20140205
CN103917306 A	20140709	CN201180073070	20111122
CO6960531 A2	20140530	CO20140042258	20140227
EA201490202 A1	20140730	EA20140090202	20111122
EP2739410 A2	20140611	EP20110811201	20111122
IL230691 A0	20140331	IL20140230691	20140128
JP2014531989 T2	20141204	JP20140524998T	20111122
KR20140047136 A	20140421	KR20147004505	20111122
MX2014001442 A1	20140912	MX20140001442	20140205
US2013032316 AA	20130207	US20110302356	20111122
US2013034695 AA	20130207	US20120586945	20120816
US8574704 BB	20131105	US20120586945	20120816
WO13022467 A2	20130214	WO2011US61898	20111122
WO13022467 A3	20130613	WO2011US61898	20111122

Priority:

US20110515395P 20110805 US20110302356 20111122 US20120586945 20120816
WO2011US61898 20111122

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Inventor(s): RAJEEV DHIMAN ; KRIPA K VARANASI ; J DAVID SMITH ; ERNESTO REZA GARDUNO CABELLO ; SMITH J

Agent(s): KIRKHAM NICHOLAS ANDREW; CHOATE HALL AND STEWART LLP; HAULBROOK WILLIAM R ET AL

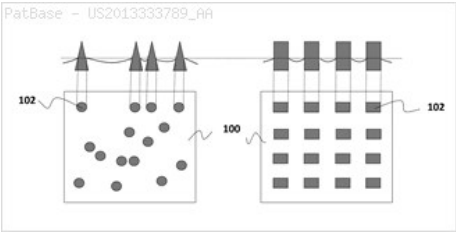
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Title: APPARATUS WITH A LIQUID-IMPREGNATED SURFACE TO FACILITATE MATERIAL CONVEYANCE

Abstract: Source: US2013333789A Described herein are conduits for conveying fluids and/or solids, the conduits having an interior surface that provide a high-slip boundary condition, thereby facilitating the flow of material therethrough. In some embodiments, the conduit has an interior surface with an impregnating liquid and a plurality of micro-scale and/or nano-scale solid features spaced sufficiently close to stably contain the impregnating liquid therebetween. The impregnating liquid fills spaces between the solid features, the interior surface stably contains the impregnating liquid between the solid features, and the impregnating liquid is substantially held in place between the plurality of solid features regardless of orientation of the interior surface and regardless of flow, passage, or removal of fluids and/or solids through, into, or out of the conduit.

Classifications:

International (IPC 8-9): A61K9/00 A61K9/02 A61K9/20 A61K9/48 A61K9/70 A61L31/14 C09D5/00 F16L55/00 G02C7/04 (Advanced/Invention)
CPC: F16L55/00 A61L31/14 A61K9/4808 A61K9/2072 A61K9/025 A61K9/703 A61K9/0087 A61L15/34 A61L15/42 A61L27/28 A61L27/34 A61L27/50 A61L28/0034 A61L28/0061 A61L28/0069 A61L29/08 A61L29/085 A61L29/14 A61L31/08 A61L31/10 A61L2400/10 A61L2400/12 A61L2400/18 G02C7/049 F16L58/04 C09D5/00 Y10T428/24355 Y10T428/24372
US: 138/145 351/159.04 424/400 424/402 424/443 424/451 424/464 428/141 428/143 600/16



Family:

Publication number	Publication date	Application number	Application date
CA2874096 AA	20141119	CA20132874096	20130524
CN104619791 A	20150513	CN201380038296	20130524
EP2855603 A2	20150408	EP20130742294	20130524
US2013333789 AA	20131219	US20130902718	20130524
US2013335697 AA	20131219	US20130902689	20130524
US2013337027 AA	20131219	US20130902614	20130524
WO13177579 A2	20131128	WO2013US42771	20130524
WO13177579 A3	20140724	WO2013US42771	20130524

Priority:

US20120651541P 20120524 US20120651542P 20120524 US20120651543P 20120524
US20130902718 20130524 US20130902689 20130524 US20130902614 20130524
WO2013US42771 20130524

Assignee(s): (std): MASSACHUSETTS INST TECHNOLOGY

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Inventor(s): (std): SMITH J DAVID ; SOLOMON BRIAN R ; VARANASI KRIPA K ; DHIMAN RAJEEV ; LOVE CHRISTOPHER J ; PAXSON ADAM T ; LOVE CHRISTOPHER J

Inventor(s): SMITH J ; VARANASI KRIPA KUS ; SOLOMON BRIAN RUS ; SMITH J DAVIDUS ; PAXSON ADAM TUS ; LOVE CHRISTOPHER JUS ; DHIMAN RAJEEVUS

Agent(s): KIRKHAM NICHOLAS ANDREW; PELLIGRINO JEFFREY S ET AL

Designated states: AE AG AL AM AO AT AU AZ BA BB BE BF BG BH BJ BN BR BW BY BZ CA CF CG CH CI CL CM CN CO CR CU CY CZ DE DK DM DO DZ EC EE EG ES FI FR GA GB GD GE GH GM GN GQ GR GT GW HN HR HU ID IE IL IN IS IT JP KE KG KM KN KP KR KZ LA LC LI LK LR LS LT LU LV LY MA MC MD ME MG MK ML MN MR MT MW MX MY MZ NA NE NG NI NL NO NZ OM PA PE PG PH PL PT QA RO RS RU RW SC SD SE SG SI SK SL SM SN ST SV SY SZ TD TG TH TJ TM TN TR TT TZ UA UG US UZ VC VN ZA ZM ZW

Title: APPARATUS AND METHODS EMPLOYING LIQUID-IMPREGNATED SURFACES

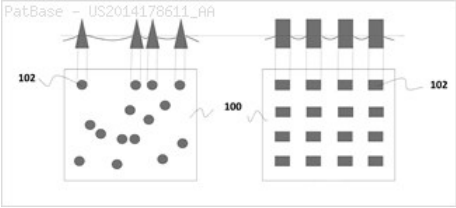
Abstract: Source: US2014178611A In certain embodiments, the invention is directed to apparatus comprising a liquid-impregnated surface, said surface comprising an impregnating liquid and a matrix of solid features spaced sufficiently close to stably contain the impregnating liquid therebetween or therewithin, and methods thereof. In some embodiments, one or both of the following holds: (i) $0 < f \leq 0.25$, where f is a representative fraction of the projected surface area of the liquid-impregnated surface corresponding to non-submerged solid at equilibrium; and (ii) $\text{Sow}(a) < 0$, where $\text{Sow}(a)$ is spreading coefficient, defined as $\gamma_{\text{w-a}} - \gamma_{\text{w-o}} - \gamma_{\text{a-o}}$, where γ is the interfacial tension between the two phases designated by subscripts w , a , and o , where w is water, a is air, and o is the impregnating liquid.

Classifications:

International (IPC 8-9): B08B17/06 B29C59/02 C09D5/16 (Advanced/Invention)

CPC: B08B17/065 C09D5/1681 C09D5/1656 C09D5/1693 B64D15/06 B64F5/0054 Y10T428/13 Y10T428/24355 Y10T428/24802 F28F19/006 F28F2245/04

US: 428/141 428/195.1 428/34.1



Family:

Publication number	Publication date	Application number	Application date
AU2013344352 AA	20140522	AU20130344352	20131119
US2014178611 AA	20140626	US20130084126	20131119
WO14078867 A1	20140522	WO2013US70827	20131119

Priority:

US20120728219P 20121119 US20130827444P 20130524 US20130084126 20131119
WO2013US70827 20131119

Assignee(s): (std): MASSACHUSETTS INST TECHNOLOGY

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Inventor(s): (std): ANAND SUSHANT ; BENGALURU SUBRAMANYAM SRINIVAS PRASAD ; RYKACZEWSKI KONRAD ; RYKACZEWSKI KONRAD ; SMITH J DAVID ; SUBRAMANYAM SRINIVAS PRASAD BENGALURU ; VARANASI KRIPA K

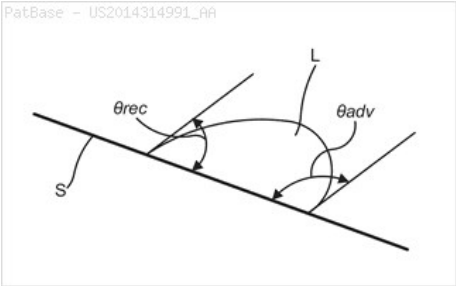
Agent(s): SHMIDT VERA A ET AL

Designated states: AE AG AL AM AO AT AU AZ BA BB BE BF BG BH BJ BN BR BW BY BZ CA CF CG CH CI CL CM CN CO CR CU CY CZ DE DK DM DO DZ EC EE EG ES FI FR GA GB GD GE GH GM GN GQ GR GT GW HN HR HU ID IE IL IN IR IS IT JP KE KG KM KN KP KR KZ LA LC LK LR LS LT LU LV LY MA MC MD ME MG MK ML MN MR MT MW MX MY MZ NA NE NG NI NL NO NZ OM PA PE PG PH PL PT QA RO RS RU RW SA SC SD SE SG SI SK SL SM SN ST SV SY SZ TD TG TH TJ TM TN TR TT TZ UA UG US UZ VC VN ZA ZM ZW

Title: METHODS AND ARTICLES FOR LIQUID-IMPREGNATED SURFACES FOR THE INHIBITION OF VAPOR OR GAS NUCLEATION

Abstract: Source: US2014314991A Embodiments described herein relate generally to devices, systems and methods for producing liquid-impregnated surfaces for the inhibition of vapor or gas nucleation. In some embodiments, an apparatus having a liquid-impregnated surface includes a first surface having a first roll off angle. A plurality of solid features are disposed on the first surface such that interstitial regions are defined between the solid features. An impregnating liquid is disposed in the interstitial regions which are dimensioned and configured to remain impregnated by the impregnating liquid. The impregnating liquid disposed in the interstitial regions at least partially defines a second surface having a second roll off angle less than the first roll off angle. Furthermore, the second surface has substantially less nucleation sites for formation of bubbles in a contact liquid that includes a gas dissolved therein and is disposed on the second surface, as compared to the first surface.

Classifications:
International (IPC 8-9): A47J36/02 B01F3/04 F01D5/28 (Advanced/Invention)
CPC: A47J36/025 B01F15/00844 Y10T428/24355 F01D5/28
US: 220/573.1 416/241R 428/141



Family:

Publication number	Publication date	Application number	Application date
US2014314991 AA	20141023	US20140215241	20140317
WO14145586 A1	20140918	WO2014US30379	20140317

Priority:

US20130794335P 20130315 US20140215241 20140317

Assignee(s): (std): GOUNDEN COLIN ; LIQUIGLIDE INC ; SMITH JONATHAN DAVID ; YAGUE JOSE

Inventor(s): (std): YAGUE JOSE ; SMITH JONATHAN DAVID ; GOUNDEN COLIN

Agent(s): BLINKA THOMAS A ET AL

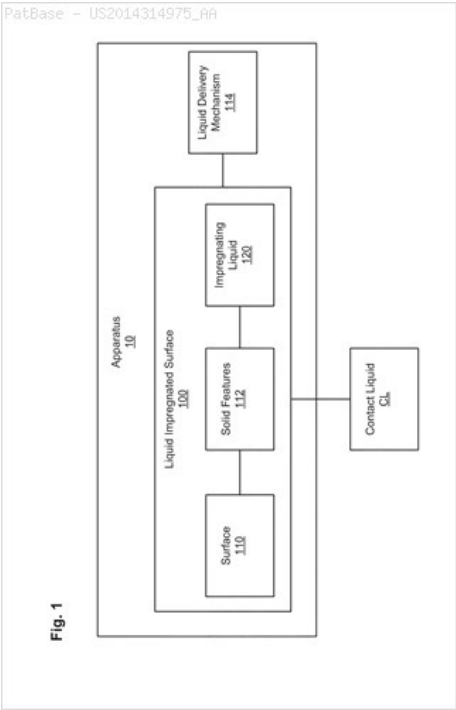
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Title: METHODS AND ARTICLES FOR LIQUID-IMPREGNATED SURFACES WITH ENHANCED DURABILITY

Abstract: Source: US2014314975A Embodiments described herein relate generally to devices, systems and methods for producing liquid impregnated surfaces with enhanced durability. In some embodiments, a liquid-impregnated surface includes a first surface having a first roll off angle. A plurality of solid features are disposed on the first surface, such that a plurality of interstitial regions are defined between the plurality of solid features. An impregnating liquid is disposed in the interstitial regions. Furthermore, the interstitial regions are dimension and configured such that the surface remains impregnated by the impregnating liquid. The impregnating liquid disposed in the interstitial regions defines a second surface which has a second roll off angle less than the first roll off angle. The apparatus also includes a liquid delivery mechanism configured to transfer the impregnating liquid to the interstitial regions.

Classifications:

International (IPC 8-9): B05C7/00 B05D5/08 B29C33/58
F16N7/12 (Advanced/Invention)
CPC: B29C33/58 B05C7/00 F16N7/12 B29C39/026 B29C39/10 Y10T428/13
Y10T428/24355 Y10T137/0318
US: 137/1 427/258 428/141 428/34.1



Family:

Publication number	Publication date	Application number	Application date
US2014314975 AA	20141023	US20140215245	20140317
WO14145414 A1	20140918	WO2014US30179	20140317

Priority:

US20130794493P 20130315 US20140215245 20140317

Assignee(s): (std): BOERS CARSTEN ; CARBECK JEFFREY ; CONG TAO ; GREEN EMILY ; HIBBEN CHARLES W ; SMITH JONATHAN DAVID ;
VARANASI KRIPA ; LIQUIGLIDE INC

Inventor(s): (std): BOERS CARSTEN ; CARBECK JEFFREY ; CONG TAO ; GREEN EMILY ; HIBBEN CHARLES W ; SMITH JONATHAN DAVID ;
VARANASI KRIPA

Agent(s): BLINKA THOMAS A ET AL

Designated states: AE AG AL AM AO AT AU AZ BA BB BE BF BG BH BJ BN BR BW BY BZ CA CF CG CH CI CL CM CN CO CR CU CY CZ DE DK
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PL PT QA RO RS RU RW SA SC SD SE SG SI SK SL SM SN ST SV SY SZ TD TG TH TJ TM TN TR TT TZ UA UG US UZ VC VN
ZA ZM ZW

Title: NON-TOXIC LIQUID IMPREGNATED SURFACES

Abstract: Source: US2015076030A Embodiments described herein relate generally to containers having liquid-impregnated surfaces disposed on their interior surfaces. The liquid-impregnated surfaces may compose an arrangement of solid and/or semi-solid features, defining one or more interstitial regions therebetween, and an impregnating liquid preferentially wetted to those regions. The containers may be designed to contain a product that is intended for human or animal consumption. The solid and/or semi-solid features and the impregnating liquid collectively define a secondary surface (e.g., substantially parallel to the interior surface on which the liquid-impregnated surfaces are disposed) and may include materials which are non-toxic. In particular, non-toxic liquid-impregnated surfaces of the disclosure may be configured for use in food, drugs, health and/or beauty product applications.

Classifications:

International (IPC 8-9): B32B3/02 B65D85/72 (Advanced/Invention)

CPC: B65D85/72

US: 206/524.3



Family:

Publication number	Publication date	Application number	Application date
US2015076030 AA	20150319	US20140487794	20140916
WO15039085 A1	20150319	WO2014US55827	20140916

Priority:

US20130878481P 20130916 US20140487794 20140916

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Agent(s): BLINKA THOMAS A ET AL

Designated states: AE AG AL AM AO AT AU AZ BA BB BE BF BG BH BJ BN BR BW BY BZ CA CF CG CH CI CL CM CN CO CR CU CY CZ DE DK DM DO DZ EC EE EG ES FI FR GA GB GD GE GH GM GN GQ GR GT GW HN HR HU ID IE IL IN IR IS IT JP KE KG KM KN KP KR KZ LA LC LK LR LS LT LU LV LY MA MC MD ME MG MK ML MN MR MT MW MX MY MZ NA NE NG NI NL NO NZ OM PA PE PG PH PL PT QA RO RS RU RW SA SC SD SE SG SI SK SL SM SN ST SV SY SZ TD TG TH TJ TM TN TR TT TZ UA UG US UZ VC VN ZA ZM ZW