EXHIBIT A

Representative U.S. Patents (Front Pages)

Litman v. Goldberg, Index No. 524343/2025

Patents issued after 7/21/2024 with Richard C. Litman as attorney (SOL-safe)

Exhibit	Patent No.	Issue Date	Title
1	12043608	2024-07-23	2-(Benzo[b]thiophen-3-yl)-1-butyl-4,5-diphenyl-1H-imida...
2	12043609	2024-07-23	6'(4-methoxyphenyl)-2'-alkoxy-3,4'-bipyridine-3'-carbon...
3	12049459	2024-07-30	3-(4,5-Diphenyl-2-(pyridin-3-yl)-1H-imidazol-1-yl)-N,N-...
4	12054460	2024-08-06	9-(5-bromo-2-hydroxyphenyl)-10-[3-(dimethylamino)propyl...
5	12054464	2024-08-06	Methyl 4-((5-(3-fluorophenyl)-4-phenyl-4H-1,2,4-triazol...
6	12062780	2024-08-13	Hydrovoltaic power generation devices utilizing carbon ...
7	12065424	2024-08-20	6'(4-methoxyphenyl)-2'-alkoxy-3,4'-bipyridine-3'-carbon...
8	12071437	2024-08-27	Pyrazolo[1,5-a]pyrido[4,3-e]pyrimidine-2-carboxylic aci...
9	D1046141	2024-10-08	Dental tool for anchoring a rubber dam
10	12114620	2024-10-15	Vertical tubers planter and harvester
11	12116333	2024-10-15	3,3'-(hydrazine-1,2-diyl)bis(1-(naphthalen-2-yloxy)prop...
12	12194434	2025-01-14	Imidazolium ionic liquids made using cardanol extracted...

Exhibit A-1

U.S. Patent No.: 12043608

Issue Date: 2024-07-23

Title: 2-(Benzo[b]thiophen-3-yl)-1-butyl-4,5-diphenyl-1H-imidazole as an anti-inflammat...

US012043608B1

(12) **United States Patent**
Khalaf Ali et al.

(10) **Patent No.: US 12,043,608 B1**
(45) **Date of Patent: Jul. 23, 2024**

(54) **2-(BENZO[B]THIOPHEN-3-YL)-1-BUTYL-4,5-DIPHENYL-1H-IMIDAZOLE AS AN ANTI-INFLAMMATORY AND ANTI-MICROBIAL COMPOUND**

(71) Applicant: **KING FAISAL UNIVERSITY**, Al-Ahsa (SA)

(72) Inventors: **Mai Mostafa Khalaf Ali**, Al-Ahsa (SA); **Hany Mohamed Abd El-Lateef Ahmed**, Al-Ahsa (SA); **Antar Ahmed Abdelhamid Ahmed**, Al-Baha (SA); **Adel A. Marzouk**, Al-Ahsa (SA)

(73) Assignee: **KING FAISAL UNIVERSITY**, Al-Ahsa (SA)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **18/242,465**

(22) Filed: **Sep. 5, 2023**

(51) **Int. Cl.**
C07D 401/04 (2006.01)
A61P 31/04 (2006.01)
A61P 31/10 (2006.01)

(52) **U.S. Cl.**
CPC ***C07D 401/04*** (2013.01); ***A61P 31/04*** (2018.01); ***A61P 31/10*** (2018.01)

(58) **Field of Classification Search**
None
See application file for complete search history.

(56) **References Cited**

FOREIGN PATENT DOCUMENTS

WO	02/085864 A1	10/2002
WO	2013/052585 A2	4/2013

OTHER PUBLICATIONS

Baladhandapani et al., Imidazole-pyridine hybrids as potent anti-cancer agents, 2023, European Journal of Pharmaceutical Sciences, vol. 180, pp. 1-11. (Year: 2023).*

Albayati et al., "Piperidinium Hydrogen Sulfate (PHS) as an Efficient Ionic Liquid Catalyst for the Synthesis of Imidazole Derivative Under Solvent-Free Condition", Journal of Heterocyclic Chemistry, vol. 56, Issue 5, May 2019, pp. 1514-1519.

Marzouk et al., "New Method for Synthesis of Multi-Substituted Imidazoles", Journal of Heterocyclic Chemistry, vol. 55, Issue 7, Jul. 2018, pp. 1775-1782.

* cited by examiner

Primary Examiner — Nannette Holloman
(74) *Attorney, Agent, or Firm* — Nath, Goldberg & Meyer; Richard C. Litman

(57) **ABSTRACT**

A compound 2-(Benzo[b]thiophen-3-yl)-1-butyl-4,5-diphenyl-1H-imidazole compound, its synthesis, and its use as an anti-microbial and anti-inflammatory agent.

4 Claims, 2 Drawing Sheets

Exhibit A-2

U.S. Patent No.: 12043609

Issue Date: 2024-07-23

Title: 6'(4-methoxyphenyl)-2'-alkoxy-3,4'-bipyridine-3'-carbonitrile as antimicrobial c...

US012043609B1

(12) **United States Patent**
Ahmed et al.

(10) **Patent No.: US 12,043,609 B1**
(45) **Date of Patent: Jul. 23, 2024**

(54) **6'(4-METHOXYPHENYL)-2'-ALKOXY-3,4'-BIPYRIDINE-3'-CARBONITRILE AS ANTIMICROBIAL COMPOUNDS**

(71) Applicant: **KING FAISAL UNIVERSITY**, Al-Ahsa (SA)

(72) Inventors: **Hany Mohamed Abd El-Lateef Ahmed**, Al-Ahasa (SA); **Mai Mostafa Khalaf Ali**, Al-Ahsa (SA); **Antar Ahmed Abdelhamid Ahmed**, Sohag (EG); **Amer A. Amer**, Sohag (EG)

(73) Assignee: **KING FAISAL UNIVERSITY**, Al-Ahsa (SA)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **18/379,906**

(22) Filed: **Oct. 13, 2023**

(51) **Int. Cl.**
C07D 401/04 (2006.01)
A61P 31/04 (2006.01)
A61P 31/10 (2006.01)

(52) **U.S. Cl.**
CPC ***C07D 401/04*** (2013.01); ***A61P 31/04*** (2018.01); ***A61P 31/10*** (2018.01)

(58) **Field of Classification Search**
CPC C07D 401/04
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

5,750,708	A	5/1998	Bryant et al.
5,916,905	A	6/1999	Weier et al.
2005/0182103	A1	8/2005	Finke et al.
2020/0331913	A1	10/2020	Lindstrom et al.

FOREIGN PATENT DOCUMENTS

KR	101806638	B1	12/2017
WO	2018134847	A1	7/2018

OTHER PUBLICATIONS

Amer et al., J. Heterocyclic Chem., 2017, 54, 3126-3132.*
Goda et al., Bioorganic & Medicinal Chemistry 2004, 12(8), 1845-1852.*
Krinochkin et al., "Synthesis And Luminescence Of New Water-Soluble Lanthanide Complexes Of Dtta-Containing 4-(4-Methoxyphenyl)-2,2'-Bipyridine", Inorganica Chimica Acta, vol. 478, Jun. 1, 2018, pp. 49-53.
Pandian et al., "4-(4-Chlorophenyl)-6-Methoxy-2,2 '-Bipyridine-5-Carbonitrile", Acta Crystallographica Section E Structure Reports Online 65(Pt 5):o995, May 2009.
Kovalev et al., "Synthesis Of 5-(4-Methoxyphenyl)-2,2'-Bipyridine-Based Schiff Base With Pyrene Moiety", AIP Conference Proceedings 2280, 040026 (2020).

* cited by examiner

Primary Examiner — Shobha Kantamneni
(74) *Attorney, Agent, or Firm* — Nath, Goldberg & Meyer; Richard C. Litman

(57) **ABSTRACT**

A 6'-(4-methoxyphenyl)-2'-alkoxy-3.4'-bipyridine-3'-carbonitrile compound, its synthesis, and its use as an antimicrobial agent.

2 Claims, No Drawings

Exhibit A-3

U.S. Patent No.: 12049459

Issue Date: 2024-07-30

Title: 3-(4,5-Diphenyl-2-(pyridin-3-yl)-1H-imidazol-1-yl)-N,N-dimethylpropan-1-amine as...

US012049459B1

(12) **United States Patent**
Ahmed et al.

(10) **Patent No.: US 12,049,459 B1**
(45) **Date of Patent: *Jul. 30, 2024**

(54) **3-(4,5-DIPHENYL-2-(PYRIDIN-3-YL)-1H-IMIDAZOL-1-YL)-N,N-DIMETHYLPROPAN-1-AMINE AS AN ANTICANCER COMPOUND**

(71) Applicant: **KING FAISAL UNIVERSITY**, Al-Ahsa (SA)

(72) Inventors: **Hany Mohamed Abd El-Lateef Ahmed**, Al-Ahsa (SA); **Mai Mostafa Khalaf Ali**, Al-Ahsa (SA); **Antar Ahmed Abdelhamid Ahmed**, Al-Baha (EG); **Nawf Esanani**, Al-Ahsa (SA); **Adel A. Marzouk**, Al Azhar (EG)

(73) Assignee: **KING FAISAL UNIVERSITY**, Al-Ahsa (SA)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 6 days.

This patent is subject to a terminal disclaimer.

(21) Appl. No.: **18/241,394**

(22) Filed: **Sep. 1, 2023**

(51) **Int. Cl.**

A61K 31/4439	(2006.01)
A61K 31/4178	(2006.01)
A61P 35/00	(2006.01)
C07D 401/04	(2006.01)

(52) **U.S. Cl.**
CPC ***C07D 401/04*** (2013.01); ***A61K 31/4439*** (2013.01); ***A61P 35/00*** (2018.01); *A61K 31/4178* (2013.01)

(58) **Field of Classification Search**
CPC A61P 31/04; A61P 31/10; C07D 401/04; A61K 31/4178; A61K 31/4439
See application file for complete search history.

(56) **References Cited**

PUBLICATIONS

Copending U.S. Appl. No. 18/237,543, filed Aug. 24, 2023. (Year: 2023).*
Shivani et al., IJPBS 2013, vol. 3 (4), pp. 270-277. (Year: 2013).*
Marzouk, et al., "Morpholinium Hydrogen Sulfate (MHS) Ionic Liquid as an Efficient Catalyst for the Synthesis of Bioactive Multi-Substituted Imidazoles (MSI) Under Solvent-Free Conditions", Zeitschrift für Naturforschung B, vol. 72 Issue 1, 2016.
Albayati, et al., "Piperidinium Hydrogen Sulfate (PHS) as an Efficient Ionic Liquid Catalyst for the Synthesis of Imidazole Derivative Under Solvent-Free Condition", Journal of Heterocyclic Chemistry, vol. 56, Issue 5, May 2019, pp. 1514-1519.
Shivani, et al., "One Pot Synthesis of Tri and Tetra Substituted Imidazole Derivatives", IJPBS | vol. 3| Issue 4 |Oct.-Dec. 2013|270-277.

* cited by examiner

Primary Examiner — Craig D Ricci
Assistant Examiner — Janet L Coppins
(74) *Attorney, Agent, or Firm* — Nath, Goldberg & Meyer; Richard C. Litman

(57) **ABSTRACT**

A compound 3-(4,5-Diphenyl-2-(pyridin-3-yl)-1H-imidazol-1-yl)-N,N-dimethylpropan-1-amine, its synthesis, and its use as an anticancer agent.

4 Claims, No Drawings

Exhibit A-4

U.S. Patent No.: 12054460

Issue Date: 2024-08-06

Title: 9-(5-bromo-2-hydroxyphenyl)-10-[3-(dimethylamino)propyl]-3,4,6,7,9,10-hexahydroa...

US012054460B1

(12) **United States Patent**
Ahmed et al.

(10) **Patent No.: US 12,054,460 B1**
(45) **Date of Patent: Aug. 6, 2024**

(54) **9-(5-BROMO-2-HYDROXYPHENYL)-10-[3-(DIMETHYLAMINO)PROPYL]-3,4,6,7,9,10-HEXAHYDROACRIDINE-1,8(2H,5H)-DIONE AS AN ANTIMICROBIAL COMPOUND**

(71) Applicant: **KING FAISAL UNIVERSITY**, Al-Ahsa (SA)

(72) Inventors: **Hany Mohamed Abd El-Lateef Ahmed**, Al-Ahsa (SA); **Mai Mostafa Khalaf Ali**, Al-Ahsa (SA); **Antar Ahmed Abdelhamid Ahmed**, Sohag (EG)

(73) Assignee: **KING FAISAL UNIVERSITY**, Al-Ahsa (SA)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **18/414,442**

(22) Filed: **Jan. 16, 2024**

Related U.S. Application Data

(62) Division of application No. 18/382,887, filed on Oct. 23, 2023, now Pat. No. 11,976,041.

(51) **Int. Cl.**

C07D 219/06	(2006.01)
A61P 31/04	(2006.01)
A61P 31/10	(2006.01)

(52) **U.S. Cl.**
CPC ***C07D 219/06*** (2013.01); ***A61P 31/04*** (2018.01); ***A61P 31/10*** (2018.01)

(58) **Field of Classification Search**
None
See application file for complete search history.

(56) **References Cited**

FOREIGN PATENT DOCUMENTS

EP	0823426 A1	2/1998
GB	793088 A	4/1958
WO	9408966 A1	4/1994
WO	2008010984 A2	1/2008

OTHER PUBLICATIONS

"9-(5-Bromo-2-Hydroxyphenyl)-10-Ethyl-3,4,6,7,9,10-Hexahydroacridine-1,8(2h,5h)-Dione".
"9-(5-Bromo-2-Hydroxyphenyl)-2,3,4,5,6,7,9,10-Octahydroacridine-1,8-Dione".
"9-(5-Bromo-2-Hydroxyphenyl)-3,3,6,6-Tetramethyl-3,4,6,7,9,10-Hexahydroacridine-1,8(2h,5h)-Dione".
"9-(5-Bromo-2-Hydroxyphenyl)-10-(2-Hydroxypropyl)-3,3,6,6-Tetramethyl-1,2,3,4,5,6,7,8,9,10-Decahydroacridine-1,8-Dione".
"9-(5-Bromo-2-Hydroxyphenyl)-3,3,6,6,10-Pentamethyl-3,4,6,7,9,10-Hexahydroacridine-1,8(2h,5h)-Dione".
"9-(5-Bromo-2-Hydroxyphenyl)-10-(3-Methoxypropyl)-3,3,6,6-Tetramethyl-4,5,7,9-Tetrahydro-2h-Acridine-1,8-Dione".
Khalilov et al., "9-(5-Bromo-2-Hy-Droxy-Phen-Yl)-10-(2-Hy-Droxy-Prop-Yl)- 3,3,6,6-Tetra-Methyl-1,2,3,4,5,6,7,8,9,10-Deca-Hydro-Acridine-1,8-Dione", Acta Crystallogr Sect E Struct Rep Online, May 1, 2011;67(Pt 5):o1146.
Eidi et al., "Nanocrystalline Tio2, Via Green Combustion Synthesis, As An Efficient And Reusable Catalyst For The Preparation Of 1,8-Dioxooctahydroxanthenes And 1,8-Dioxodecahydroacridines" Applied Organonmetallic Chemisty, vol. 29, Issue 12, Dec. 2015, pp. 793-797.
NPL-9: Balamurugan et al., "10-[2-(DimethylAmino) EthYl]-9-(4-MethoxyPhenYl)-3,3,6,6-TetraMethyl-3,4,6,7,9,10-HexaHydroAcridine-1,8(2H,5H)-dione" Acta Crystallogr Sect E Struct Rep Online, Feb. 1, 2009; 65(Pt 2): c271.
NPL-10: Sharma et al., "Application Of Cyclohexane-1,3-Diones In The Synthesis Of Six-Membered Nitrogen-Containing Heterocycles", ChemistrySelect, vol. 7, Issue 12, Mar. 29, 2022, e202200622.

Primary Examiner — David J Blanchard
Assistant Examiner — Sarah J Chickos
(74) *Attorney, Agent, or Firm* — Nath, Goldberg & Meyer; Richard C. Litman

(57) **ABSTRACT**

A 9-(5-bromo-2-hydroxyphenyl)-10-[3-(dimethylamino) propyl]-3,4,6,7,9,10-hexahydroacridine-1,8(2H,5H)-dione compound, its synthesis, and its use as an antimicrobial agent.

6 Claims, No Drawings

Exhibit A-5

U.S. Patent No.: 12054464

Issue Date: 2024-08-06

Title: Methyl 4-((5-(3-fluorophenyl)-4-phenyl-4H-1,2,4-triazol-3-ylthio)methyl)benzoate...

US012054464B1

(12) **United States Patent**
Ali et al.

(10) **Patent No.: US 12,054,464 B1**
(45) **Date of Patent: Aug. 6, 2024**

(54) **METHYL 4-((5-(3-FLUOROPHENYL)-4-PHENYL-4H-1,2,4-TRIAZOL-3-YLTHIO) METHYL)BENZOATE AS AN ANTIMICROBIAL COMPOUND**

(71) Applicant: **KING FAISAL UNIVERSITY**, Al-Ahsa (SA)

(72) Inventors: **Mai Mostafa Khalaf Ali**, Al-Ahsa (SA); **Hany Mohamed Abd El-Lateef Ahmed**, Al-Ahsa (SA); **Antar Ahmed Abdelhamid Ahmed**, Sohag (EG); **Amer A. Amer**, Sohag (EG)

(73) Assignee: **KING FAISAL UNIVERSITY**, Al-Ahsa (SA)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **18/428,327**

(22) Filed: **Jan. 31, 2024**

Related U.S. Application Data

(62) Division of application No. 18/382,959, filed on Oct. 23, 2023.

(51) **Int. Cl.**
C07D 249/12 (2006.01)
A61P 31/04 (2006.01)
A61P 31/10 (2006.01)

(52) **U.S. Cl.**
CPC ***C07D 249/12*** (2013.01); ***A61P 31/04*** (2018.01); ***A61P 31/10*** (2018.01)

(58) **Field of Classification Search**
CPC C07D 249/12
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

6,265,426	B1	7/2001	Alanine et al.
2005/0288347	A1	12/2005	Hodge et al.
2012/0302581	A1	11/2012	Ratner et al.

OTHER PUBLICATIONS

4-Benzyl-5-(2-fluoro-phenyl)-4H-[1,2,4]triazole-3-thiol, CSID: 1549775, http://www.chemspider.com/Chemical-Structure.1549775.html (accessed 18:07, Oct. 23, 2023).

3-(3-Fluorophenyl)-5-[(4-methylbenzyl)sulfanyl]-4-phenyl-4H-1,2,4-triazole,CSID:1498572, http://www.chemspider.com/Chemical-Structure.1498572.html (accessed 18:13, Oct. 23, 2023).

Methyl 3-({[5-(4-fluorophenyl)-4-phenyl-4H-1,2,4-triazol-3-yl]sulfanyl}methyl)benzoate,CSID:21572049, http://www.chemspider.com/Chemical-Structure.21572049.html (accessed 18:16, Oct. 23, 2023).

Aly et al., "chemistry and biological activities of 1,2,4-triazolethiones—antiviraland anti-infective drugs", Molecules. Jul. 2020; 25(13): 3036.

Gonnet et al., "synthesis of biologically relevant 1,2,3- and 1,3,4-triazoles: from classical pathway to green chemistry", Molecules. Sep. 2021; 26(18): 5667.

Janowska et al., "synthesis and biological evaluation of new schiff bases derived from 4-amino-5-(3-fluorophenyl)-1,2,4-triazole-3-thione", Molecules 2023, 28(6), 2718.

Primary Examiner — Golam M Shameem
(74) *Attorney, Agent, or Firm* — Nath, Goldberg & Meyer; Richard C. Litman

(57) **ABSTRACT**

An methyl 4-((5-(3-fluorophenyl)-4-phenyl-4H-1,2,4-triazol-3-ylthio)methyl)benzoate compound, its synthesis, and its use as an antimicrobial agent.

6 Claims, 1 Drawing Sheet

Exhibit A-6

U.S. Patent No.: 12062780

Issue Date: 2024-08-13

Title: Hydrovoltaic power generation devices utilizing carbon sphere-coated nickel foam...

US012062780B1

(12) **United States Patent**
Alshoaibi et al.

(10) **Patent No.: US 12,062,780 B1**
(45) **Date of Patent: Aug. 13, 2024**

(54) **HYDROVOLTAIC POWER GENERATION DEVICES UTILIZING CARBON SPHERE-COATED NICKEL FOAM/PET SUBSTRATE**

(71) Applicant: **KING FAISAL UNIVERSITY**, Al-Ahsa (SA)

(72) Inventors: **Adil Alshoaibi**, Al-Ahsa (SA); **Majid Khan**, Mardan (PK)

(73) Assignee: **KING FAISAL UNIVERSITY**, Al-Ahsa (SA)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 17 days.

(21) Appl. No.: **18/413,239**

(22) Filed: **Jan. 16, 2024**

(51) **Int. Cl.**

H01M 4/36	(2006.01)
H01M 4/04	(2006.01)
H01M 4/583	(2010.01)
H01M 4/66	(2006.01)
H01M 4/80	(2006.01)
H01M 14/00	(2006.01)

(52) **U.S. Cl.**
CPC ***H01M 4/364*** (2013.01); ***H01M 4/0404*** (2013.01); ***H01M 4/0471*** (2013.01); ***H01M 4/583*** (2013.01); ***H01M 4/661*** (2013.01); ***H01M 4/667*** (2013.01); ***H01M 4/808*** (2013.01); ***H01M 14/00*** (2013.01)

(58) **Field of Classification Search**
None
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

11,476,464	B1 *	10/2022	Li	C01B 32/168
2021/0291497	A1 *	9/2021	Shin	C22C 1/08
2023/0261209	A1 *	8/2023	Wang	H01M 10/0525 429/245

FOREIGN PATENT DOCUMENTS

WO	WO-2018067391	A1 *	4/2018	H01M 4/0471

OTHER PUBLICATIONS

Wei, et al.; "Integrated carbon spheres on nickel foam as electrode for supercapacitors", DOI: https://doi.org/10.1049/mnl.2012.0885.
Li, et al.; "NiMnCr layered double hydroxide-carbon spheres modified Ni foam: An efficient positive electrode for hybrid supercapacitors", DOI: https://doi.org/10.1016/j.cej.2020.125370.
Wang, et al.; "One-pot synthesis of nickel oxide-carbon composite microspheres on nickel foam for supercapacitors", DOI: https://doi.org/10.1007/s10853-011-6021-7.
Song, et al.; "Efficient and Stable Carbon-coated Nickel Foam Cathodes for the Electro-Fenton Process", DOI: https://doi.org/10.1016/j.electacta.2015.07.029.
Chinthaginjala, et al.; "How Carbon-Nano-Fibers attach to Ni foam", DOI: https://doi.org/10.1016/j.carbon.2008.07.002.

* cited by examiner

Primary Examiner — Scott J. Chmielecki
(74) *Attorney, Agent, or Firm* — Nath, Goldberg & Meyer; Richard C. Litman

(57) **ABSTRACT**

A process for preparing carbon spheres coated on a nickel (Ni) foam/polyethylene terephthalate (PET) substrate, as well as the use of the obtained product in the field of hydrovoltaic energy generation.

16 Claims, No Drawings

Exhibit A-7

U.S. Patent No.: 12065424

Issue Date: 2024-08-20

Title: 6'(4-methoxyphenyl)-2'-alkoxy-3,4'-bipyridine-3'-carbonitrile as antimicrobial c...

US012065424B1

(12) **United States Patent**
Ahmed et al.

(10) **Patent No.: US 12,065,424 B1**
(45) **Date of Patent: Aug. 20, 2024**

(54) **6'(4-METHOXYPHENYL)-2'-ALKOXY-3,4'-BIPYRIDINE-3'-CARBONITRILE AS ANTIMICROBIAL COMPOUNDS**

(71) Applicant: **KING FAISAL UNIVERSITY**, Al-Ahsa (SA)

(72) Inventors: **Hany Mohamed Abd El-Lateef Ahmed**, Al-Ahasa (SA); **Mai Mostafa Khalaf Ali**, Al-Ahsa (SA); **Antar Ahmed Abdelhamid Ahmed**, Sohag (EG); **Amer A. Amer**, Sohag (EG)

(73) Assignee: **KING FAISAL UNIVERSITY**, Al-Ahsa (SA)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **18/425,923**

(22) Filed: **Jan. 29, 2024**

Related U.S. Application Data

(62) Division of application No. 18/379,906, filed on Oct. 13, 2023.

(51) **Int. Cl.**

C07D 401/04	(2006.01)
A61P 31/04	(2006.01)
A61P 31/10	(2006.01)

(52) **U.S. Cl.**
CPC ***C07D 401/04*** (2013.01); ***A61P 31/04*** (2018.01); ***A61P 31/10*** (2018.01)

(58) **Field of Classification Search**
CPC A61P 31/04; A61P 31/10
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

5,750,708	A	5/1998	Bryant et al.
5,916,905	A	6/1999	Weier et al.
2005/0182103	A1	8/2005	Finke et al.
2020/0331913	A1	10/2020	Lindstrom et al.

FOREIGN PATENT DOCUMENTS

KR	101806638	B1	12/2017
WO	2018134847	A1	7/2018

OTHER PUBLICATIONS

Krinochkin et al., "Synthesis and Luminescence of New Water-Soluble Lanthanide Complexes of Dtta-Containing 4-(4-Methoxyphenyl)-2,2'-Bipyridine", Inorganica Chimica Acta, vol. 478, Jun. 1, 2018, pp. 49-53.

Pandian et al., "4-(4-Chlorophenyl)-6-Methoxy-2,2'-Bipyridine-5-Carbonitrile", Acta Crystallographica Section E Structure Reports Online 65(Pt 5):o995, May 2009.

Kovalev et al., "Synthesis of 5-(4-Methoxyphenyl)-2,2'-Bipyridine-Based Schiff Base With Pyrene Moiety", AIP Conference Proceedings 2280, 040026 (2020).

Primary Examiner — Shobha Kantamneni
(74) *Attorney, Agent, or Firm* — Nath, Goldberg & Meyer; Richard C. Litman

(57) **ABSTRACT**

A 6'-(4-methoxyphenyl)-2'-alkoxy-3,4'-bipyridine-3'-carbonitrile compound, its synthesis, and its use as an antimicrobial agent.

3 Claims, No Drawings

Exhibit A-8

U.S. Patent No.: 12071437

Issue Date: 2024-08-27

Title: Pyrazolo[1,5-a]pyrido[4,3-e]pyrimidine-2-carboxylic acids as CK2 inhibitors

US012071437B1

(12) **United States Patent**
Tratrat et al.

(10) **Patent No.: US 12,071,437 B1**
(45) **Date of Patent: Aug. 27, 2024**

(54) **PYRAZOLO[1,5-a]PYRIDO[4,3-e] PYRIMIDINE-2-CARBOXYLIC ACIDS AS CK2 INHIBITORS**

(71) Applicant: **KING FAISAL UNIVERSITY**, Al-Ahsa (SA)

(72) Inventors: **Christophe Tratrat**, Al-Ahsa (SA); **Michelyne Haroun**, Al-Ahsa (SA)

(73) Assignee: **KING FAISAL UNIVERSITY**, Al-Ahsa (SA)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **18/411,323**

(22) Filed: **Jan. 12, 2024**

(51) **Int. Cl.**
C07D 471/14 (2006.01)
A61K 31/519 (2006.01)
A61P 35/00 (2006.01)

(52) **U.S. Cl.**
CPC ***C07D 471/14*** (2013.01); ***A61K 31/519*** (2013.01); ***A61P 35/00*** (2018.01)

(58) **Field of Classification Search**
CPC C07D 471/14; A61K 31/519
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

4,066,645	A	1/1978	Denzel et al.	
2011/0065712	A1*	3/2011	Haddach	A61P 37/02 435/375

FOREIGN PATENT DOCUMENTS

CN	109232565	A	1/2019
RU	2619932	C1	5/2017

OTHER PUBLICATIONS

Bruni, et al.; "Pyrazole[1,5-a]pyrido[3,4-e]pyrimidine: A New Heterocyclic Ring System" DOI:10.3987/com-90-5471.

Luo, et al.; "Design, synthesis and antitumor evaluation of novel 5-methylpyrazolo[1,5-a]pyrimidine derivatives as potential c-Met inhibitors" DOI:10.1016/j.bioorg.2020.104356.

Horchani, et al.; "Synthesis and in silico docking of new pyrazolo [4,3-e] pyrido [1,2-a] pyrimidine-based cytotoxic agents" Doi-10.3390/ijms221910258.

Deshmukh, et al.; "An efficient synthesis of pyrazolo[1,5-a]pyrimidines and evaluation of their antimicrobial activity" DOI:10.1007/s12039-016-1141-x.

Asati, et al.; "Pyrazolopyrimidines as anticancer agents: A review on structural and target-based approaches" DOI:10.1016/j.ejmech.2021.113781.

Arias-Gomez, et al.; "Functional Pyrazolo[1,5-a]pyrimidines: Current Approaches in Synthetic Transformations and Uses as an Antitumor Scaffold" DOI: 10.3390/molecules26092708.

* cited by examiner

Primary Examiner — Andrew D Kosar
Assistant Examiner — John D Mcanany
(74) *Attorney, Agent, or Firm* — Nath, Goldberg & Meyer; Richard C. Litman

(57) **ABSTRACT**

Novel pyrazolo[1,5-a]pyrido[4,3-e]pyrimidine-2-carboxylic acid compounds, a method of synthesizing said compounds, a pharmaceutical composition comprising said compounds and a suitable carrier, and a method of using the compounds. The pyrazolo[1,5-a]pyrido[4,3-e]pyrimidine-2-carboxylic acid compounds, identified as CK2 inhibitors, are useful as anticancer and/or antitumor agents, and as agents for treating other kinase-associated conditions including inflammation, pain, and certain immunological disorders, and other types of diseases such as diabetes, viral infection, neurodegenerative diseases.

20 Claims, No Drawings

Exhibit A-9

U.S. Patent No.: D1046141

Issue Date: 2024-10-08

Title: Dental tool for anchoring a rubber dam

US0D1046141S

(12) United States Design Patent

Alsaleh

(10) Patent No.: US D1,046,141 S
(45) Date of Patent: ** *Oct. 8, 2024

(54) **DENTAL TOOL FOR ANCHORING A RUBBER DAM**

(71) Applicant: **KING SAUD UNIVERSITY**, Riyadh (SA)

(72) Inventor: **Lama Saleh Alsaleh**, Riyadh (SA)

(73) Assignee: **KING SAUD UNIVERSITY**, Riyadh (SA)

(*) Notice: This patent is subject to a terminal disclaimer.

(**) Term: **15 Years**

(21) Appl. No.: **29/746,671**

(22) Filed: **Aug. 16, 2020**

(51) **LOC (14) Cl.** **24-02**

(52) **U.S. Cl.**
USPC **D24/176**

(58) **Field of Classification Search**
USPC D24/143, 152, 154, 176–178
CPC A61C 5/00; A61C 5/80; A61C 5/82; A61C 5/85; A61C 5/90
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

1,532,821	A *	4/1925	Ivory	A61C 5/82 433/139
4,004,345	A *	1/1977	Ely	A61C 5/82 433/139
4,204,329	A	5/1980	Kahn	
4,215,477	A	8/1980	Shanel	
4,583,946	A	4/1986	Shanel	
4,639,221	A *	1/1987	Sairenji	A61C 5/82 433/139
D353,200	S	12/1994	Martin	
5,503,556	A	4/1996	Leonard et al.	
5,713,737	A *	2/1998	Sundstrom	A61C 5/82 433/139
6,609,911	B2 *	8/2003	Garrison	A61C 5/82 433/139
D491,663	S *	6/2004	Bat-Genstein	D24/176
6,981,870	B2 *	1/2006	Heasley	A61C 5/80 433/139
D556,327	S *	11/2007	Albelda	D24/176
7,648,361	B2 *	1/2010	Kilcher	A61C 5/82 433/139
9,775,686	B2 *	10/2017	Agnew	A61C 5/82

(Continued)

FOREIGN PATENT DOCUMENTS

GB	11994 A	7/1898
JP	2015-119815 A	7/2015
KR	10-2008375	10/2019

Primary Examiner — Wan Laymon
(74) *Attorney, Agent, or Firm* — Nath, Goldberg & Meyer; Richard C. Litman

(57) **CLAIM**

The ornamental design for a dental tool for anchoring a rubber dam as shown and described.

DESCRIPTION

FIG. **1** is an environmental, perspective view of a dental tool for anchoring a rubber dam;
FIG. **2** is a top perspective view thereof;
FIG. **3** is a top plan view thereof;
FIG. **4** is a bottom view thereof;
FIG. **5** is a front elevational view thereof;
FIG. **6** is a rear elevational view thereof.
FIG. **7** is a right elevational view thereof.
FIG. **8** is a left elevational view thereof.
FIG. **9** is a reduced bottom perspective view thereof; and,
FIG. **10** is a reduced top perspective view thereof.
The broken lines showing of the gum and teeth in FIG. **1** depict environmental subject matter only and form no part of the claimed design.

1 Claim, 7 Drawing Sheets

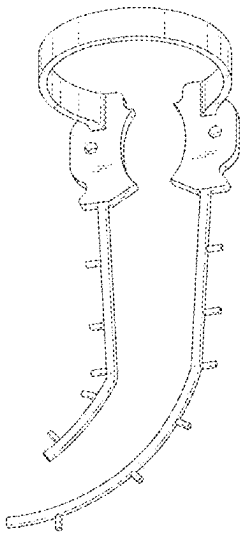

Exhibit A-10

U.S. Patent No.: 12114620

Issue Date: 2024-10-15

Title: Vertical tubers planter and harvester

US012114620B1

(12) **United States Patent**
Asem

(10) **Patent No.: US 12,114,620 B1**
(45) **Date of Patent: Oct. 15, 2024**

(54) **VERTICAL TUBERS PLANTER AND HARVESTER**

(71) Applicant: **KUWAIT INSTITUTE FOR SCIENTIFIC RESEARCH**, Safat (KW)

(72) Inventor: **Samira Omar Asem**, Safat (KW)

(73) Assignee: **KUWAIT INSTITUTE FOR SCIENTIFIC RESEARCH**, Safat (KW)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **18/241,049**

(22) Filed: **Aug. 31, 2023**

(51) **Int. Cl.**
A01G 9/02 (2018.01)
A01G 9/24 (2006.01)
A01G 22/25 (2018.01)

(52) **U.S. Cl.**
CPC ***A01G 9/023*** (2013.01); ***A01G 9/247*** (2013.01); ***A01G 9/249*** (2019.05); ***A01G 22/25*** (2018.02)

(58) **Field of Classification Search**
CPC A01G 9/023; A01G 9/022; A01G 9/00; A01G 9/02; A01G 31/00; A01G 31/06
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

5,438,797	A	8/1995	Lendel	
9,456,689	B1	10/2016	Tinsley	
2011/0252705	A1*	10/2011	Van Gemert	A01G 9/249 47/66.7
2013/0212940	A1	8/2013	Blyden	
2015/0107154	A1*	4/2015	Visser	A01G 9/249 47/66.6
2017/0105360	A1	4/2017	Kingelin et al.	
2017/0150686	A1	6/2017	Erbacher	
2018/0054986	A1*	3/2018	Fu	A01G 31/04
2018/0103599	A1*	4/2018	Zhan	A01G 31/02
2018/0317411	A1*	11/2018	Spiro	A01G 31/06
2018/0332774	A1	11/2018	Lott	
2019/0335691	A1*	11/2019	Krakover	A01G 31/06
2020/0315100	A1*	10/2020	Kiessling	A01G 9/023
2020/0375120	A1*	12/2020	Kaneko	A01G 27/003
2021/0100173	A1	4/2021	Khwaja et al.	
2021/0259169	A1	8/2021	Valiquette	
2022/0174886	A1	6/2022	Kalinowski	
2022/0217914	A1*	7/2022	Olsson	A01G 9/023
2023/0026903	A1*	1/2023	Kendall	A01G 9/247
2023/0148499	A1*	5/2023	Fujisawa	A01G 9/247 47/62 R

FOREIGN PATENT DOCUMENTS

CN	203537830 U	4/2014
CN	108697057 A	10/2018
GB	2477216 A	7/2011
RU	2693721 C1	7/2019

* cited by examiner

Primary Examiner — Kristen C Hayes
(74) *Attorney, Agent, or Firm* — Nath, Goldberg & Meyer; Richard C. Litman

(57) **ABSTRACT**

A system and method for using indoor vertical farming for cultivating tubers. The method and system include a wheeled framework with tiered platforms, the platforms forming multiple growing spaces for growing portions of a tuber crop and soil where the growing spaces are provided with irrigation and illumination. Each growing space has a paneled wheeled planter tray which rests on a platform and each portion of the tuber crop and soil can be extracted from each paneled wheeled planter tray by a lifting action to fall into a mesh covered container, used to separate the soil from the tuber crop.

6 Claims, 3 Drawing Sheets

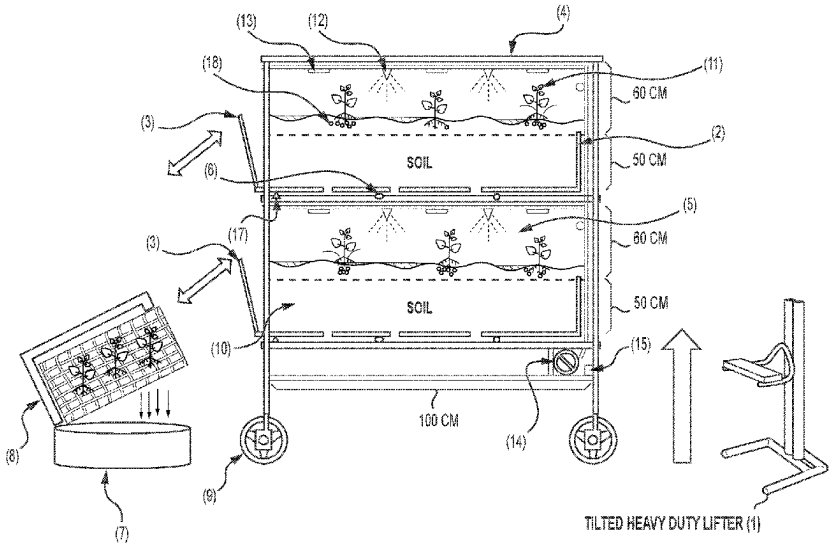

Exhibit A-11

U.S. Patent No.: 12116333

Issue Date: 2024-10-15

Title: 3,3'-(hydrazine-1,2-diyl)bis(1-(naphthalen-2-yloxy)propan-2-ol) as an ecofriendl...

US012116333B1

(12) **United States Patent**
Ali et al.

(10) **Patent No.: US 12,116,333 B1**
(45) **Date of Patent: Oct. 15, 2024**

(54) **3,3'-(HYDRAZINE-1,2-DIYL)BIS(1-(NAPHTHALEN-2-YLOXY)PROPAN-2-OL) AS AN ECOFRIENDLY INSECTICIDAL AGENT AGAINST SPODOPTERA LITTORALIS (BOISD.)**

(71) Applicant: **KING FAISAL UNIVERSITY**, Al-Ahsa (SA)

(72) Inventors: **Mai Mostafa Khalaf Ali**, Al-Ahsa (SA); **Hany Mohamed Abd El-Lateef Ahmed**, Al-Ahsa (SA); **Antar Ahmed Abdelhamid Ahmed**, Al-Baha (SA); **Mohamed A. Gad**, Giza (EG)

(73) Assignee: **KING FAISAL UNIVERSITY**, Al-Ahsa (SA)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 10 days.

(21) Appl. No.: **18/511,800**

(22) Filed: **Nov. 16, 2023**

Related U.S. Application Data

(62) Division of application No. 18/238,694, filed on Aug. 28, 2023, now Pat. No. 11,891,353.

(51) **Int. Cl.**

C07C 243/14	(2006.01)
A01N 39/00	(2006.01)
A01P 7/04	(2006.01)
C07C 241/02	(2006.01)

(52) **U.S. Cl.**
CPC ***C07C 243/14*** (2013.01); ***A01N 39/00*** (2013.01); ***A01P 7/04*** (2021.08); ***C07C 241/02*** (2013.01)

(58) **Field of Classification Search**
CPC C07C 243/14; C07C 241/02; A01P 7/04; A01N 39/00
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

2008/0171769 A1 7/2008 Gregor et al.

FOREIGN PATENT DOCUMENTS

EP 2019090 A1 1/2009

OTHER PUBLICATIONS

Colomban et al., "Different Strategies for Obtaining Enantiopure Hemicryptophanes", Synthesis 2019; 51(10): 2081-2099.
CID 126468044; created Apr. 13, 2017.

Primary Examiner — Jared Barsky
(74) *Attorney, Agent, or Firm* — Nath, Goldberg & Meyer; Richard C. Litman

(57) **ABSTRACT**

A compound 3,3'-(hydrazine-1.2-diyl)bis(1-(naphthalen-2-yloxy)propan-2-ol), its synthesis, and its use as an insecticidal agent.

8 Claims, 1 Drawing Sheet

Exhibit A-12

U.S. Patent No.: 12194434

Issue Date: 2025-01-14

Title: Imidazolium ionic liquids made using cardanol extracted from cashew nutshell oil...

US012194434B1

(12) **United States Patent**
Atta et al.

(10) **Patent No.: US 12,194,434 B1**
(45) **Date of Patent: Jan. 14, 2025**

(54) **IMIDAZOLIUM IONIC LIQUIDS MADE USING CARDANOL EXTRACTED FROM CASHEW NUTSHELL OIL TO ENHANCE CRUDE OIL RECOVERY IN OILFIELDS**

(71) Applicant: **KING SAUD UNIVERSITY**, Riyadh (SA)

(72) Inventors: **Ayman M. Atta**, Riyadh (SA); **Hamad A. Al-Lohedan**, Riyadh (SA); **Abdelrahman O. Ezzat**, Riyadh (SA); **Ali K. Aldalbahi**, Riyadh (SA)

(73) Assignee: **KING SAUD UNIVERSITY**, Riyadh (SA)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 25 days.

(21) Appl. No.: **18/612,504**

(22) Filed: **Mar. 21, 2024**

Related U.S. Application Data

(62) Division of application No. 18/212,034, filed on Jun. 20, 2023, now Pat. No. 11,969,708.

(51) **Int. Cl.**

H01M 4/48	(2010.01)
B01J 20/04	(2006.01)
B01J 20/06	(2006.01)
B01J 20/10	(2006.01)
B01J 20/26	(2006.01)
B01J 20/28	(2006.01)
B01J 20/30	(2006.01)
B01J 20/32	(2006.01)
C02F 1/28	(2023.01)
C02F 1/68	(2023.01)
C07D 233/60	(2006.01)
C08G 65/331	(2006.01)
C08G 65/333	(2006.01)
C08G 65/337	(2006.01)
E02B 15/04	(2006.01)
H01M 4/36	(2006.01)
C02F 101/32	(2006.01)
C02F 103/08	(2006.01)

(52) **U.S. Cl.**
CPC ***B01J 20/265*** (2013.01); ***B01J 20/043*** (2013.01); ***B01J 20/06*** (2013.01); ***B01J 20/103*** (2013.01); ***B01J 20/28009*** (2013.01); ***B01J 20/28016*** (2013.01); ***B01J 20/3085*** (2013.01); ***B01J 20/3204*** (2013.01); ***B01J 20/3221*** (2013.01); ***B01J 20/3287*** (2013.01); ***B01J 20/3293*** (2013.01); ***C02F 1/288*** (2013.01); ***C02F 1/681*** (2013.01); ***C07D 233/60*** (2013.01); ***C08G 65/3317*** (2013.01); ***C08G 65/33317*** (2013.01); ***C08G 65/337*** (2013.01); ***E02B 15/041*** (2013.01); *C02F 1/281* (2013.01); *C02F 1/285* (2013.01); *C02F 2101/32* (2013.01); *C02F 2103/08* (2013.01)

(58) **Field of Classification Search**
CPC B01J 20/043; B01J 20/06; B01J 20/103; B01J 20/28016; B01J 20/28009; B01J 20/3085; B01J 20/3221; B01J 20/3287; B01J 20/3293; C02F 1/288; C02F 1/681; C07D 233/60; C08G 65/33317; C08G 65/337; E02B 15/041
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

7,845,409	B2	12/2010	Shinbach et al.
2007/0181302	A1	8/2007	Bicerano
2016/0075940	A1	3/2016	Rappolt
2017/0349814	A1	12/2017	Gupta

FOREIGN PATENT DOCUMENTS

CN	110484227	A	11/2019
CN	112143578	A *	12/2020

OTHER PUBLICATIONS

Eke et al., "Performance Evaluation of Cashew Nut Shell Liquid CNSL as Flow Improver for Waxy Crude Oils," SPE Nigeria Annual International Conference and Exhibition, Lagos, Nigeria, Aug. 2019.

* cited by examiner

Primary Examiner — Yong L Chu
(74) *Attorney, Agent, or Firm* — Nath, Goldberg & Meyer; Richard C. Litman

(57) **ABSTRACT**

Modified chemical structures of cardanol extracted from cashew nut shell oil, and the use of the same to prepare imidazolium ionic liquids (IILs). The IILs can be used to prepare different types of silica, magnetite and calcium carbonate nanoparticles (NPs) as multifunctional oilfield chemicals for use in various oil spill collection, de-emulsification, viscosity improvement, asphaltene dispersant, and enhanced oil recovery applications.

7 Claims, 13 Drawing Sheets