(51) **Int. Cl.**
F28D 15/04 (2006.01)
H01L 23/427 (2006.01)

(52) **U.S. Cl.**
CPC ***H01L 23/427*** (2013.01); *F28F 2215/06* (2013.01); *F28F 2240/00* (2013.01)

(58) **Field of Classification Search**
CPC F28D 15/0266; H01L 23/427; F28F 2215/06; F28F 2240/00; F24F 3/1417
USPC 165/80.4
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

6,994,152	B2	2/2006	Rosenfeld et al.	
7,705,342	B2	4/2010	Henderson et al.	
7,957,132	B2	6/2011	Fried	
8,587,944	B2	11/2013	Trautman	
2002/0056908	A1	5/2002	Brownell et al.	
2006/0237167	A1	10/2006	Lee	
2009/0040726	A1	2/2009	Hoffman et al.	
2010/0200200	A1	8/2010	Tonosaki et al.	
2012/0247735	A1	10/2012	Ito et al.	
2013/0228313	A1*	9/2013	Fried	H05K 7/20336 165/104.26
2014/0240918	A1	8/2014	Damaraju et al.	
2014/0332187	A1	11/2014	MacDonald et al.	

FOREIGN PATENT DOCUMENTS

TW	258337	U	3/2005
TW	455153	U	6/2013
WO	2006074583	A1	7/2006

OTHER PUBLICATIONS

Hogue, Christopher William. "An Experimental Study of Enhanced Thermal Conductivity Utilizing Columnated Silicon Microevaporators for Convective Boiling Heat Transfer at the Microscale" Dissertation, University of California, Berkeley, Fall 2011. Retrieved from URL: http://digitalassets.lib.berkeley.edu/etd/ucb/text/Hogue_berkeley_0028E_11719.pdf.

Ponugoti, Priyanka, et al. "Study of Transient Behavior of the Evaporator of the Planar Micro Loop Heat Pipe" Retrieved on Oct. 30, 2017 from URL: https://tfaws.nasa.gov/TFAWS05/Website/files/ThermalPaperSession/TFAWS05_PPonugoti_TH.pdf.

International Search Report and Written Opinion dated Nov. 16, 2018 in International (PCT) Application No. PCT/US2018/050041.

Office Action dated Jun. 25, 2019 in Taiwanese Patent Application No. 107132170, and English translation thereof.

Office Action dated Jan. 18, 2019 in U.S. Appl. No. 15/797,996.

Notice of Allowance dated May 29, 2019 in U.S. Appl. No. 15/797,996.

International Preliminary Report on Patentability for International Application No. PCT/US2018/050041 dated May 14, 2020. 8 pages.

Notification of the First Office Action for Chinese Patent Application No. 201880025929.6 dated Apr. 15, 2020. 6 pages.

"Wang, Peng. "On-Chip Thermoelectric Cooling of Semiconductor Hot Spot" Dissertation, Unviersity of Maryland, Collge Park, 2007. Retrieved from URL: https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=7&cad=rja&uact=8&ved=0ahUKEwjF3Zvt0sDUAhUBzz4KHXxJCd8QFghNMAY&url=http%3A%2F%2Fdrum.lib.umd.edu%2Fbitstream%2Fhandle%2F1903%2F7413%2Fumi-umd-4843.pdf%3Fsequence%3D1%26isAllowed%3Dy&usg=AFQjCNHWcJu6B-2VePjHG2aaDmDBvIzPTg&sig2=OzEqOBm2GXbD4_06mVegag".

* cited by examiner