(51) **Int. Cl.**

B01D 63/08	(2006.01)
B01D 65/02	(2006.01)
B01D 53/26	(2006.01)
B01D 53/02	(2006.01)
F24F 3/14	(2006.01)
B01D 61/02	(2006.01)
B01D 61/14	(2006.01)

(52) **U.S. Cl.**

CPC ***B01D 53/268*** (2013.01); ***B01D 63/081*** (2013.01); ***B01D 63/082*** (2013.01); ***B01D 63/084*** (2013.01); ***B01D 63/085*** (2013.01); ***B01D 65/02*** (2013.01); ***F24F 3/14*** (2013.01); *B01D 61/02* (2013.01); *B01D 61/14* (2013.01); *B01D 71/028* (2013.01); *B01D 2253/108* (2013.01); *B01D 2257/504* (2013.01); *B01D 2311/13* (2013.01); *B01D 2315/10* (2013.01); *Y02C 10/10* (2013.01); *Y10T 29/49826* (2015.01)

(56) **References Cited**

U.S. PATENT DOCUMENTS

4,832,115 A * 5/1989 Albers B01D 1/14 165/104.31
4,900,448 A * 2/1990 Bonne B01D 53/268 210/321.8
5,605,628 A * 2/1997 Davidson B01D 67/0041 210/321.83
5,624,555 A * 4/1997 Kutowy B01D 63/084 210/224
5,798,049 A * 8/1998 Proulx B01D 25/001 210/321.74
6,197,203 B1 * 3/2001 Ishida B01D 61/16 210/748.11
7,143,597 B2 * 12/2006 Hyland F24F 5/0035 62/236
7,197,887 B2 * 4/2007 Maisotsenko F24F 3/1411 165/165
7,258,329 B2 * 8/2007 Sasamoto H01M 8/02 261/104
7,264,724 B2 * 9/2007 Vigna B01D 3/20 210/321.61
7,279,215 B2 * 10/2007 Hester B01D 63/082 210/321.64
7,316,780 B1 * 1/2008 Fendya A23C 9/1422 210/503
7,404,848 B2 * 7/2008 Okada H01M 8/0273 156/326
7,527,661 B2 * 5/2009 Chellappa B01J 19/0093 422/198
7,585,355 B2 * 9/2009 Gonjo F28F 3/083 210/640
7,691,266 B2 * 4/2010 Fendya A23C 9/1422 210/321.72
7,875,106 B2 1/2011 Liu
8,020,516 B2 * 9/2011 Labra Reynolds A01K 61/002 119/238
8,623,210 B2 * 1/2014 Manabe B01D 63/082 210/231
8,673,067 B2 3/2014 Liu et al.
8,876,943 B2 * 11/2014 Gottlieb B01D 19/0031 95/46
8,919,746 B2 * 12/2014 Vanderwees H01M 8/04074 261/102
9,101,874 B2 * 8/2015 Vandermeulen F28F 1/02
9,101,875 B2 * 8/2015 Vandermeulen F28F 1/02
9,203,097 B2 * 12/2015 Martinchek H01M 8/0228
2002/0104439 A1 * 8/2002 Komkova B01D 53/22 96/4
2003/0209480 A1 * 11/2003 Kneifel B01D 53/22 210/321.8
2004/0061245 A1 * 4/2004 Maisotsenko F02B 29/0462 261/153
2004/0109798 A1 * 6/2004 Chopard B01D 63/082 422/198
2004/0226877 A1 * 11/2004 Karode B01D 63/08 210/321.85
2005/0130016 A1 * 6/2005 Yang H01M 8/0258 429/465
2006/0090650 A1 5/2006 Yamakawa et al.
2008/0085437 A1 * 4/2008 Dean B01D 53/268 429/413
2008/0251444 A1 * 10/2008 Fendya A23C 9/1422 210/487
2009/0008316 A1 * 1/2009 Verhaeghe B01D 25/26 210/230
2010/0304953 A1 12/2010 Liu et al.
2010/0311157 A1 * 12/2010 Van Alstyne C10L 1/02 435/294.1
2011/0052466 A1 3/2011 Liu
2011/0155662 A1 6/2011 Liu et al.
2011/0258837 A1 * 10/2011 Scannon G05B 19/4188 29/592
2012/0111784 A1 * 5/2012 Morita B01D 29/39 210/232
2012/0118145 A1 5/2012 Claridge et al.
2012/0118147 A1 5/2012 Claridge et al.
2012/0181712 A1 * 7/2012 Vanderwees H01M 8/04074 261/102
2012/0228213 A1 * 9/2012 Ishii B01D 63/082 210/490
2012/0252105 A1 * 10/2012 Ahrens C12M 21/02 435/257.3
2013/0017416 A1 * 1/2013 Goeting B01D 61/50 429/2
2013/0186121 A1 * 7/2013 Erb F24F 3/1417 62/238.1
2014/0251810 A1 * 9/2014 Lepa B01D 61/50 204/539
2014/0260398 A1 * 9/2014 Kozubal F25B 15/00 62/271
2014/0262991 A1 * 9/2014 Edinger C02F 1/001 210/97
2015/0377562 A1 * 12/2015 Buckrell B23P 15/26 165/181

* cited by examiner