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Paper 9
Entered: September 19, 2014

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

EDMUND OPTICS, INC.,
Petitioner,

v.

SEMROCK, INC.,
Patent Owner.

Case IPR2014-00583
Patent 7,068,430 C1

Before WILLIAM A. CAPP, TRENTON A. WARD, and
DAVID C. McKONE, *Administrative Patent Judges.*

CAPP, *Administrative Patent Judge.*

DECISION
Institution of *Inter Partes* Review
37 C.F.R. § 42.108

Edmund Optics, Inc. ("Edmund") filed a Petition (Paper 1, "Pet.") requesting *inter partes* review of claims 1, 18, 21, 26, 27, 30, and 34–41 of U.S. Patent No. 7,068,430 C1 (Ex. 1001, the "'430 patent"). Semrock, Inc. ("Semrock") filed a Patent Owner Preliminary Response (Paper 7, "Prelim. Resp."). We have jurisdiction under 35 U.S.C. § 314(a). We conclude that Edmund has shown a reasonable likelihood of prevailing in challenging claim 1 and we institute an *inter partes* review as to such claim.

I. BACKGROUND

A. The '430 Patent (Ex. 1001)

The '430 patent, titled Method of Making Highly Discriminating Optical Edge Filters And Resulting Products, relates to making optical filters that block unwanted light and are used in Raman spectroscopy and fluorescence microscopy. Ex. 1001, 1:22–28. The patent discloses optical edge filters with alternating layers of materials disposed over a transparent substrate and where the thickness of the various layers affects the performance of the filter. *Id.* at claim 18; 3:14–28. The patent also claims a method of manufacturing optical filters and claims applications for the optical filters made in accordance with the method of claim 1. *Id.* at claims 1, 18.

In the claimed method, a data processor receives deposition rate data as an input. *Id.* at 8:24–25. The data processor calculates a theoretical transmission of light through a layer of the filter. *Id.* at claim 1. For at least some layers, the data processor calculates an expected time for deposition of material to achieve the desired thickness related to the desired optical properties of a layer. *Id.* at 9:24–26. For these layers, their deposition durations are controlled using an expected deposition time based on a designed thickness and deposition rate. *Id.* For other layers, deposition duration is controlled by optically monitoring transmission levels through the layer. *Id.* at 9:19–23. The data processor determines which layers are optically monitored and which layers are timed using an expected deposition time. *Id.* at 9:26–29.

According to the Specification, the invention achieves edge steepness in optical filters of less than about 0.8%. *Id.* at 14:23–27. The Specification states that the steepness of edge slope achieved by the invention permits return of response wavelengths closer to excitation wavelength providing an increase in the information content of the returned response, and that the reduction in transmission loss means that the enhanced information return response will be at higher brightness. *Id.* at 16:46–51. Furthermore, the Specification describes that the greater hardness and durability of the filters purportedly permits a more robust and versatile optical analytical instrument. *Id.* at 16:51–54.

B. Illustrative Claims

Edmund challenges claims 1, 18, 21, 26, 27, 30, and 34–41. Claims 1 and 30 are independent claims. Claims 1 and 30 (with paragraph indentation added to claim 30) are reproduced below:

> 1. A method of manufacturing an optical filter by determining when deposition of a layer of the optical filter is to terminate, the method comprising:
>
> calculating, with a data processor, a theoretical transmission T_i of light through the layer;
>
> calculating, with the data processor, an expected deposition time t_i of the layer,

measuring, during deposition of the layer for a period less than t_i, a measured transmission T_m of light through the layer;

determining, with the data processor, when deposition of the layer is to terminate based upon the theoretical transmission T_i and the measured transmission T_m.

30. An optical edge filter comprising a transparent substrate having a surface and alternating thin layer of materials having respectively different indices of refraction disposed overlying the surface, the materials comprising

hard coating materials, and

the thicknesses of the layers chosen to produce a filter edge steepness less than about 0.8%, wherein edge steepness is defined as (a) an edge width from a 50% transmission wavelength to an optical density 6 ("OD6") wavelength divided by (b) the 50% transmission wavelength.

C. The Asserted Grounds of Unpatentability

Edmund challenges claims 1, 18, 21, 26, 27, 30, and 34–41 of the '430 patent based on the alleged grounds of unpatentability set forth in the table below, as further supported by the Declaration of H. Angus Macleod (Ex. 1017) and the Declaration of Uwe Schallenberg. (Ex. 1018).

Reference(s)	**Basis**	**Claims challenged**
Schwiecker[1] (Ex. 1002)	§ 102	1
Starke[2] (Ex. 1003)	§ 102	1

[1] Schwiecker et al., US 4,207,835, patented June 17, 1980.

[2] Starke et al., *Rapid Prototyping of Optical Thin Film Filters*, 4094 PROC. OF SPIE 83–92 (2000).

Reference(s)	Basis	Claims challenged
Schwiecker and Sullivan[3] (Ex. 1007) and/or Vidal I[4] (Ex 1008) and/or Vidal II[5] (Ex. 1009), and/or Banning[6] (Ex. 1015)	§ 103	1, 26, and 27
Starke and Sullivan and/or Vidal I and/or Vidal II, and/or Banning	§ 103	1, 26, and 27
Schwiecker, Sullivan, Reichman[7] (Ex. 1013), and/or Carrabba[8] (Ex. 1014)	§ 103	18 and 21
Starke, Sullivan, Reichman, and/or Carrabba	§ 103	18 and 21
Jensen[9] (Ex. 1004), Macleod[10] (Ex. 1006), Pulker[11] (Ex. 1010), Willey I[12] (Ex. 1011), Willey II[13] (1012), and/or Verly[14] (Ex. 1016), Reichman, and/or Carrabba	§ 103	30 and 34–41

[3] Brian T. Sullivan & J.A. Dobrowolski, *Deposition Error Compensation for Optical Multilayer Coatings. I. Theoretical Description*, 31 APPLIED OPTICS 3821–3835 (1992).

[4] B. Vidal et al., *Optical Monitoring of Nonquarterwave Multilayer Filters*, 17 APPLIED OPTICS 1038–1047 (1978).

[5] B. Vidal et al., *Wideband Optical Monitoring of Nonquarterwave Multilayer Filters*, 18 APPLIED OPTICS 3851–3856 (1979).

[6] Mary Banning, *Practical Methods of Making and Using Multilayer Filters*, 37 J. OPT. SOC. AM. 792–797 (1947).

[7] Jay Reichman, *Chroma Handbook of Optical Filters for Fluorescence Microscopy*, 1–30 and G-1 – G-5 (June 1998).

[8] Carrabba et al., US 5,112,127, patented May 12, 1992.

[9] Traci R. Jensen et al., *Advances in Filter Technology for Multiphoton Microscopy*, 4262 PROC. OF SPIE 48–51 (2001).

[10] H. A. Macleod, THIN-FILM OPTICAL FILTERS 210–388 (Taylor & Francis Group, 3rd ed.) (2001).

[11] H.K. Pulker, COATINGS ON GLASS 428–437 (Elsevier Science B.V.) (1984).

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