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[54] **INKS CONTAINING BLOCK COPOLYMER MICELLES**

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[*] Notice: The portion of the term of this patent subsequent to Aug. 18, 2009 has been disclaimed.

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Related U.S. Application Data

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[52] U.S. Cl. **106/21; 106/20; 106/22; 106/23**

[58] Field of Search **106/22; 8/647**

[56] References Cited

U.S. PATENT DOCUMENTS

3,656,981	4/1972	Beschke et al.	106/491
3,784,502	1/1974	Gobran	260/33.6 PQ
4,043,752	8/1977	Kelmurry et al.	8/527
4,153,587	5/1979	Yui	260/23 H
4,267,310	5/1981	Landell	260/40 R
4,308,327	12/1981	Bird et al.	430/15
4,543,308	9/1985	Schumann et al.	430/21
4,552,914	11/1985	Sterling	524/269
4,597,794	7/1986	Ohta et al.	106/20
4,664,708	5/1987	Allen	106/22
4,705,567	11/1987	Hair et al.	106/20
4,728,984	3/1988	Daniele	355/6
4,777,510	10/1988	Russel	355/7
4,877,451	10/1989	Winnik et al.	106/23

FOREIGN PATENT DOCUMENTS

92578	9/1989	European Pat. Off. .
54-053034	4/1979	Japan .
55-137166	10/1980	Japan .
56-155262	12/1981	Japan .
7112489	9/1971	Netherlands .

OTHER PUBLICATIONS

Xerox Disclosure Journal, "Copy Sheet Size and Weight Sensing", Robinson, Jr., Norman D., vol. 13, No. 4, Jul./Aug. 1988.

Ouellet, Christian et al., "Transient Networks in ABA Block Copolymer-Microemulsion Systems", *Macromolecules* 23 (13) 334752 (abstract).

Zhow, Zukany et al., "Anamalous association behavior of an ethylene oxide-propylene oxide ABA block copolymer in water", *Macromolecules* 20 (12), 3889-3891 (abstract).

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[57] ABSTRACT

Disclosed is an ink composition which comprises an aqueous liquid vehicle and particles of an average diameter of 100 nanometers or less which comprise micelles of block copolymers of the formula ABA, wherein A represents a hydrophilic segment and B represents a hydrophobic segment, and wherein dye molecules are covalently attached to the micelles, said dye molecules being detectable when exposed to radiation outside the visible wavelength range. Optionally, silica is precipitated within the micelles. In a specific embodiment, the dye molecules are substantially colorless. In another specific embodiment, the ink also contains a colorant detectable in the visible wavelength range.

56 Claims, No Drawings