

# Advancement in UV-Visible-IR Camouflage Textiles for Concealment of Defense Surveillance against Multidimensional Combat Backgrounds

Md. Anowar Hossain

School of Fashion and Textiles, RMIT University, 25 Dawson Street, Brunswick, Melbourne, VIC 3056, Australia

([enr.anowar@yahoo.com](mailto:enr.anowar@yahoo.com))

Table SI.1. Summarized spectral coefficients of sun radiation, CB materials and camouflage materials for design of camouflage textiles in UV-Vis-IR illumination.

a. Electron energy, E (eV) of sun radiation in UV-Vis-IR													
Wavelength (nm)	100	220	300	380	500	700	810	1000	2500	10000			
Electron energy, E (eV)	12.4	5.6	4	3.26	2.47	1.77	1.53	1.24	0.5	0.12			
b. Irradiance coefficients of sun radiation in UV-Vis-IR													
Wavelength (nm)	250	500	750	1000	1250	1500	1750	2000	2250	2500			
Irradiance (W/m <sup>2</sup> /nm)	0.2	1.75	1.5	0.75	0.45	0.3	0.25	0.2	0.2	0.15			
c. Reflectance coefficients of snowland combat background in UV-Vis-IR													
Wavelength (nm)	400	500	600	700	800	900	1000	1100	1200				
Reflectance	0.64	0.66	0.63	0.62	0.61	0.58	0.42	0.45	0.4				
d. Reflectance coefficients of iceland combat background in UV-Vis-IR													
Wavelength (nm)	400	500	600	700	800	900	1000	1100	1200				
Reflectance	0.48	0.5	0.53	0.5	0.48	0.4	0.22	0.24	0.23				
e. Reflectance coefficients of water combat background in UV-Vis-IR													
Wavelength (nm)	400	500	600	700	800	900	1000	1100	1200				
Reflectance	0.04	0.03	0.03	0.03	0.02	0.01	0.01	0.01	0.01				
f. Radiance coefficients of sky combat background in UV-Vis-IR													
Wavelength (nm)	300	500	700	900	1100	1300	1500	1700	1900				
Radiance (W/m <sup>2</sup> /nm/sr)	0.15	0.4	0.25	0.15	0.05	0.05	0.03	0.05	0.01				
g. Reflectance coefficients of woodland combat background (grass) in UV-Vis-IR													
Wavelength (nm)	700	800	900	1000	1100	1200	1300	1400	1500	1600			
Reflectance coefficient	0.3	0.35	0.4	0.45	0.5	0.48	0.45	0.3	0.33	0.35			
h. Reflectance coefficients of woodland combat background (tree bark) in UV-Vis-IR													
Wavelength (nm)	500	1000	1500	2000	2500								
Reflectance coefficient	0.1	0.4	0.38	0.25	0.15								
i. Reflectance coefficients of soil background in UV-Vis-IR													
Wavelength (nm)	500	750	1000	1250	1500	1750	2000	2250	2500				
Reflectance coefficient	0.1	0.3	0.35	0.4	0.41	0.42	0.43	0.38	0.37				
j. Reflectivity (%) of sand combat background													
Wavelength (nm)	2000	4000	6000	8000	10000	12000	14000						
Reflectivity (%)	73	70	5	2	8	3	5						
k. Reflectivity (%) of sand combat background													
Wavelength (nm)	400	600	800	1000	1200								
Reflectivity (%)	8	20	22	25	25								
l. Reflection (%) of woodland combat background													
Wavelength (nm)	300	500	700	900	1100	1300	1500	1700	1900				
Vegetation	4	6	6	50	52	48	20	28	10				
Deciduous tree	5	6	5	55	50	48	22	32	5				
m. Reflection (%) of urban combat background (brick & concrete)													
Wavelength (nm)	300	500	700	900	1100	1300	1500	1700	1900				
Red brick	5	11	25	28	32	35	35	35	35				
Concrete	5	30	38	35	34	34	33	33	30				
n. Vis-IR photonic signal for simultaneous camouflage coloration													
Pixel position	50	100	150	200	250	300							
Vis	0.68	0.55	0.15	0.95	0.35	0.18							
IR	0.78	0.78	0.99	0.82	0.85	0.82							
Simultaneous Vis-IR	1.46	1.33	1.14	1.77	1.2	1							
o. Reflectance (%) of high reflection materials in UV-Vis-IR													
Wavelength (nm)	200	400	600	800	1000	10000							
Aluminium	90	91	90	90	92	98							
Rhodium	60	77	78	81	80	95							
Copper	40	35	78	95	98	98							
Titanium	30	45	55	56	57	88							
Silver	30	35	45	98	98	98							
Gold	30	5	98	98	98	98							
p. Absorption coefficients of synthetic dyes in UV-Vis-IR													
Wavelength (nm)	350	400	450	500	550	600	650	700	750	800	850	900	950
Chrysoidine	0.9	0.7	0.8	0.7	0.4	0.2	0.1	0.09	0.08	0.06	0.05	0.04	0.03
Chrysophenine G	0.69	0.8	0.8	0.6	0.2	0.1	0.09	0.08	0.05	0.02	0.01	0.01	0.01
Orange 2	0.9	0.7	0.7	0.8	0.5	0.12	0.1	0.09	0.05	0.04	0.02	0.02	0.02
Lithol fast scarlet-RNP	0.5	0.52	0.51	0.61	0.51	0.1	0.08	0.05	0.04	0.04	0.04	0.04	0.04
Flavophosphine	0.9	0.68	0.71	0.6	0.29	0.18	0.12	0.1	0.09	0.08	0.05	0.04	0.04
q. Reflection (%) of ZnO pigment in Vis-IR													
Wavelength (nm)	400	500	600	700	800	900	1000	1100	1200	1300	1400	1500	1600
Reflection (%)	80	85	85	85	85	85	85	85	84	84	80	83	83
Wavelength (nm)			1700	1800	1900	2000	2100	2200					
Reflection (%)			83	83	83	85	85	85					