

High-performance water-borne fluorescent acrylic based adhesive: Synthesis and application

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ELECTRONIC SUPPLEMENTARY INFORMATIONS (ESI)

1. Paper and wood samples for adhesive strength test

To find the applications and to test the adhesive strength, four different sets of paper samples were taken for the test with different GSM (Gram per Square Meter) values as per ASTM-D1876 peel method (T peel test), as shown in Figure S1 (A). Similarly, the adhesive test was performed for wooden materials as per ASTM D-906 as shown in Figure S1 (B). The wood specimen taken was *Gmelina Arborea*, popularly known as Gomari (in local Assamese language).

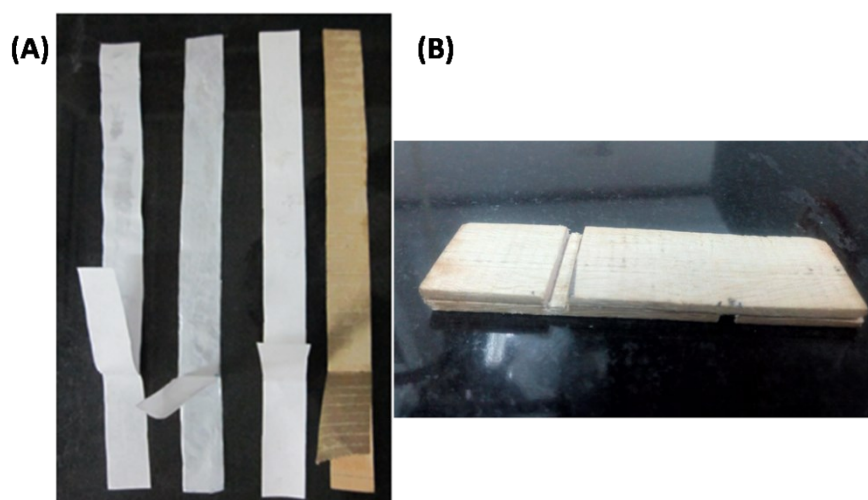


Figure S1: (A) Different paper specimen to test adhesive strength as per ASTM D-1876,
(B) Wooden specimen prepared to test adhesive strength as per ASTM D-906

2. Dispersion of polymer adhesives in different solvents

The dispersions of P(VP-Acr) and P(Acn-Acr) are shown in figures S2 and S3 respectively. Similar to that for P(VP-Acn-Acr), in these two cases also water was found to be the most suitable solvent for the formulation of adhesive gels.

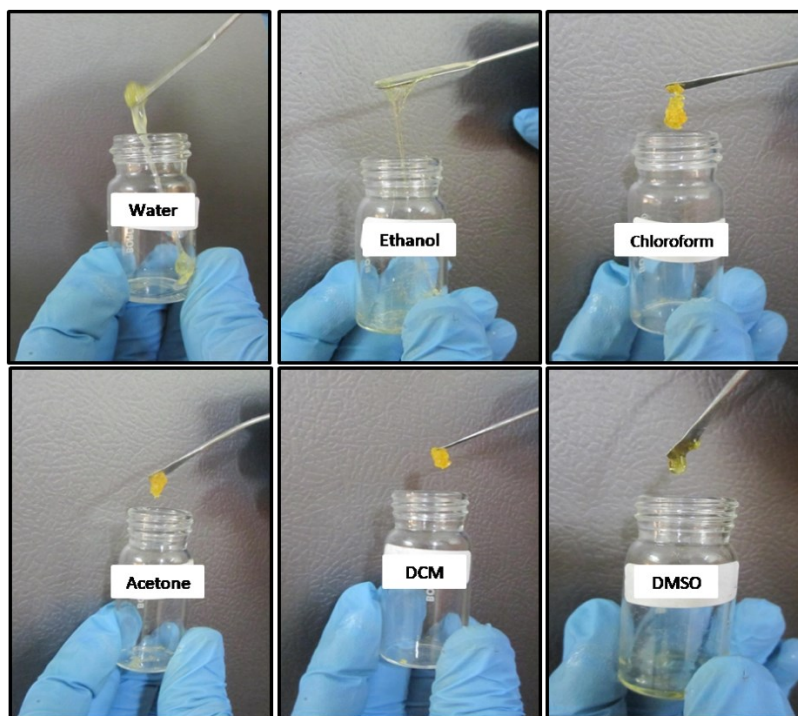


Figure S2: The dispersion of polymer powder, P(VP-Acr) in various solvents

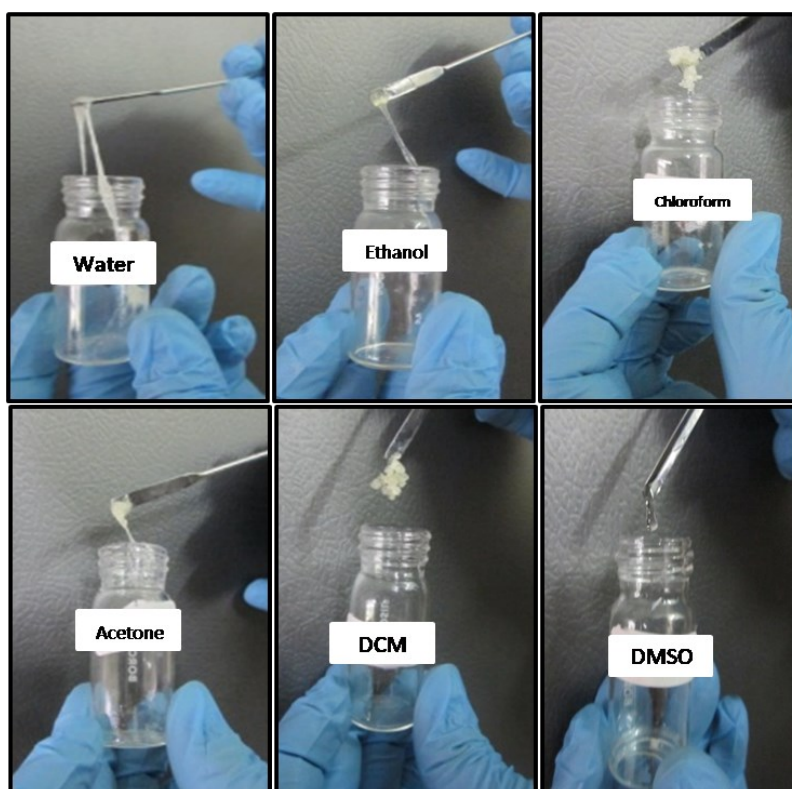


Figure S3: The dispersion of polymer powder, P(Acn-Acr) in various solvents

3. GPC

The number average molecular mass (M_n) and weight average molecular mass (M_w) of the polymer adhesives were analysed with the help of GPC. The molecular mass distribution of the polymers is shown in Figure S4 (A, B and C). The

polydispersity index of P(VP-Acr), P(Acn-Acr), and P(VP-Acn-Acr) were found to be 1.0227, 1.0095 and 1.0122 respectively, which indicate that the formed polymer adhesives are monodispersed.

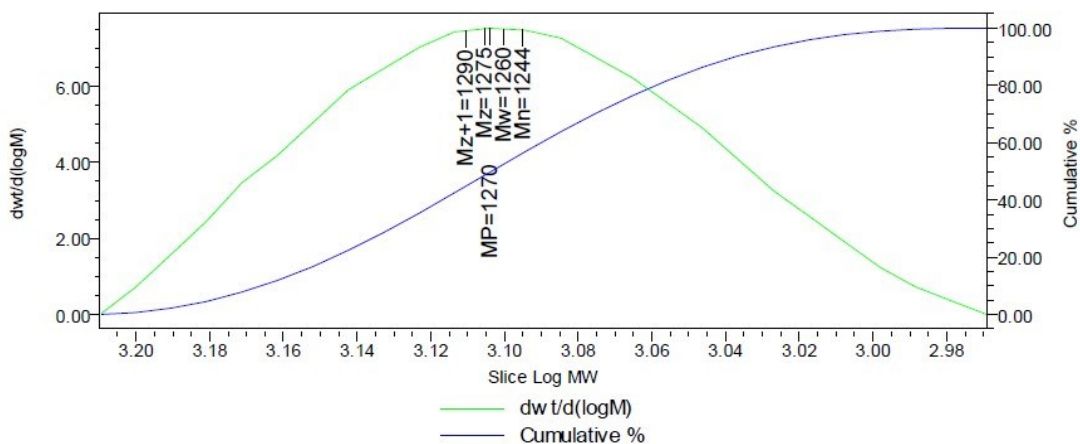


Figure S3 (A): Molecular mass distribution of P(VP-Acr)

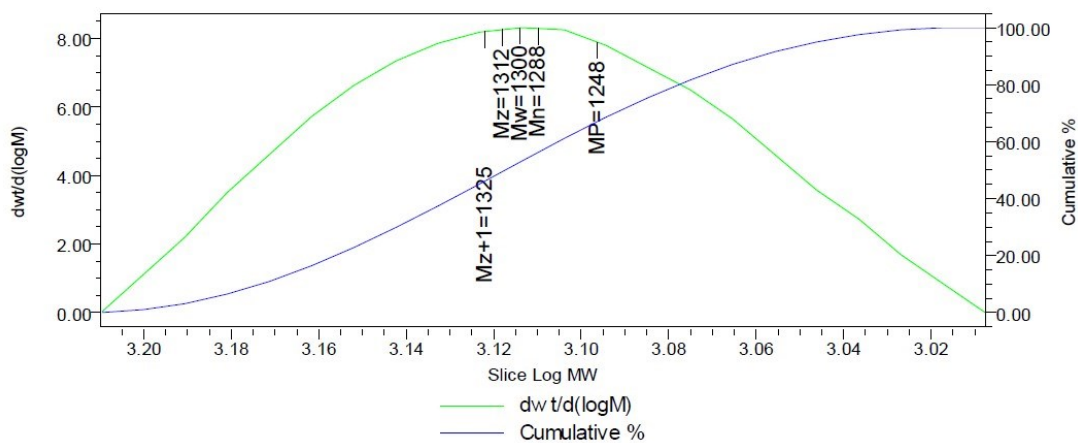


Figure S3 (B): Molecular mass distribution of P(Acn-Acr)

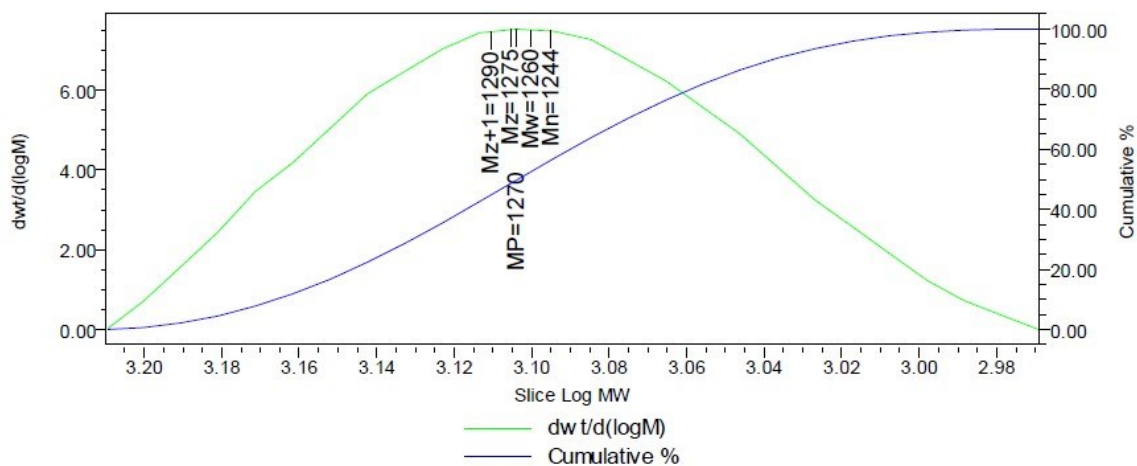


Figure S3 (C): Molecular mass distribution of P(VP-Acn-Acr)

4. Statistical Analysis

Table S1. Statistical analysis of the mechanical test data of the prepared adhesives the commercially available adhesive

Adhesives	Sl. No.	The maximum force required to rupture adhesive joints (N)	Standard Deviation (SD) and Mean	Force/Width (N/mm)	Standard Deviation (SD) and Mean	Lap shear strength Maximum Force/Area (KPa)
P(VP-Acr) adhesive	1.	122.90	Mean=	4.726	Mean=	486
	2.	172.90	121.5	6.570	4.670	
	3.	127.00		4.922		
	4.	29.65		1.136		
	5.	77.40	SD=	2.964	SD=	
	6.	16.65	97.77	0.638	3.77	
	7.	304.00		11.740		
P(Acn-Acr) adhesive	1.	13.85	Mean=	0.521	Mean=	78
	2.	22.50	21.90	0.843	0.79	
	3.	5.35		0.2004		
	4.	21.00		0.824		
	5.	20.33		0.779		
	6.	48.35	SD=	1.582	SD=	
	7.	Specimen failure	14.43	-	0.46	
P(VP-Acn-Acr) adhesive	1.	763.00	Mean=	30.520	Mean=	2150
	2.	693.00	839.57	26.650	32.63	
	3.	763.00		29.350		
	4.	710.00		27.300		
	5.	1344.00		52.900		
	6.	707.00	SD=	27.190	SD=	
	7.	897.00	232.85	34.500	9.34	
Commercial adhesive	1.	469.50	Mean=	18.200	Mean=	1331
	2.	627.00	496.65	24.300	19.15	
	3.	555.00		20.940		
	4.	401.50		15.560		
	5.	832.00	SD=	31.760	SD=	
	6.	303.60	192.98	11.950	7.24	
	7.	288.00		11.350		