

Supplementary Information

Nano-Composite of Magnetite and Hot-Water-Soluble Starch: A Cooperation Resulting in an Amplified Catalytic Activity on Water

Sanaz Razikazemi, Kurosh Rad-Moghadam,* and Saeedeh Toorchi Roudsari

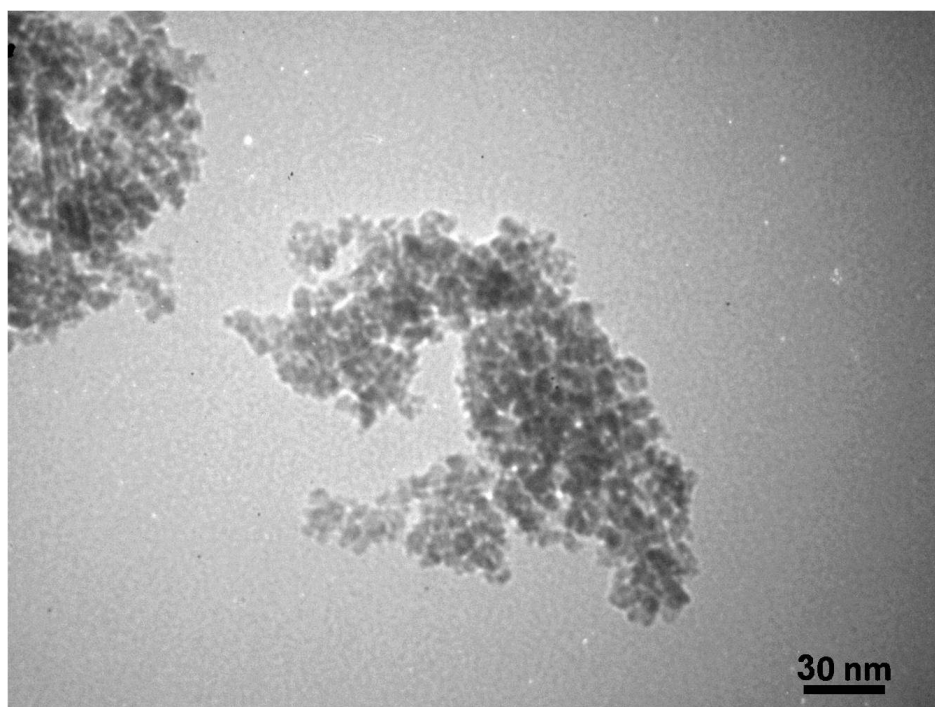
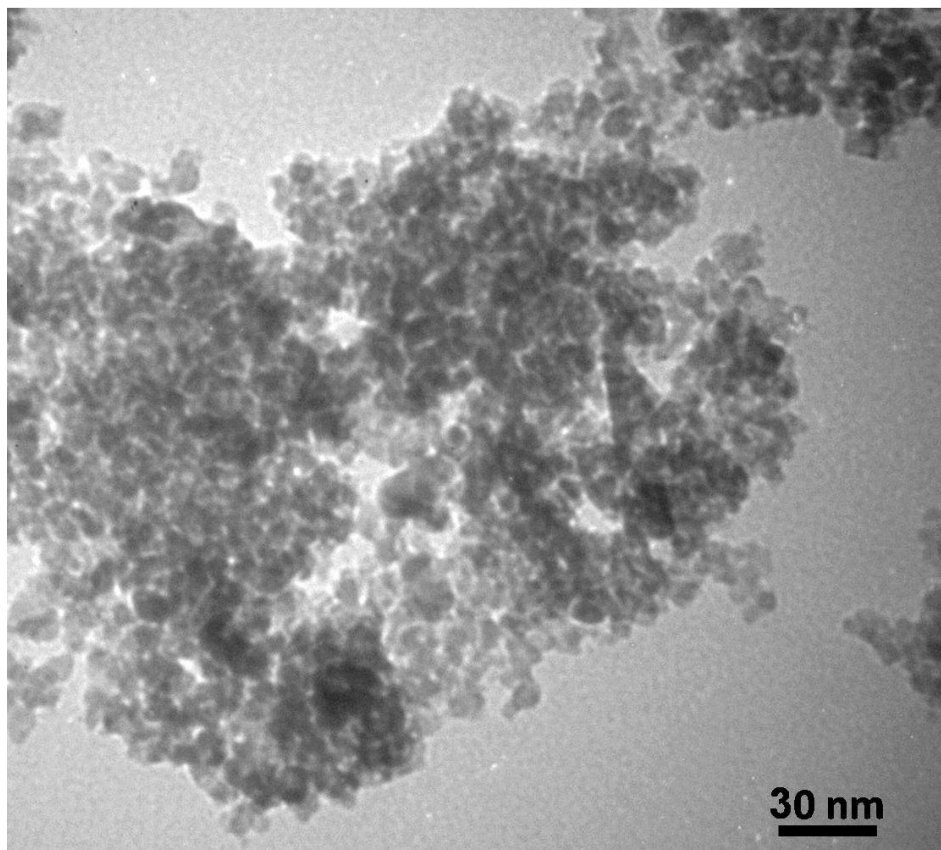
Chemistry department, University of Guilan, Rasht 41335-19141; radmm@guilan.ac.ir

S₁ Determining the optimized amount of the catalyst, solvent, and temperature for the trial synthesis of 3,3'-(4-chlorophenyl)methylene-bis-(4-hydroxycoumarin-3-yl) **4d** and 3,4,6,7-tetrahydro-3,3,6,6-tetramethyl-9-(4-chlorophenyl)-2*H*-xanthene-1,8(5*H*,9*H*)-dione **5b**

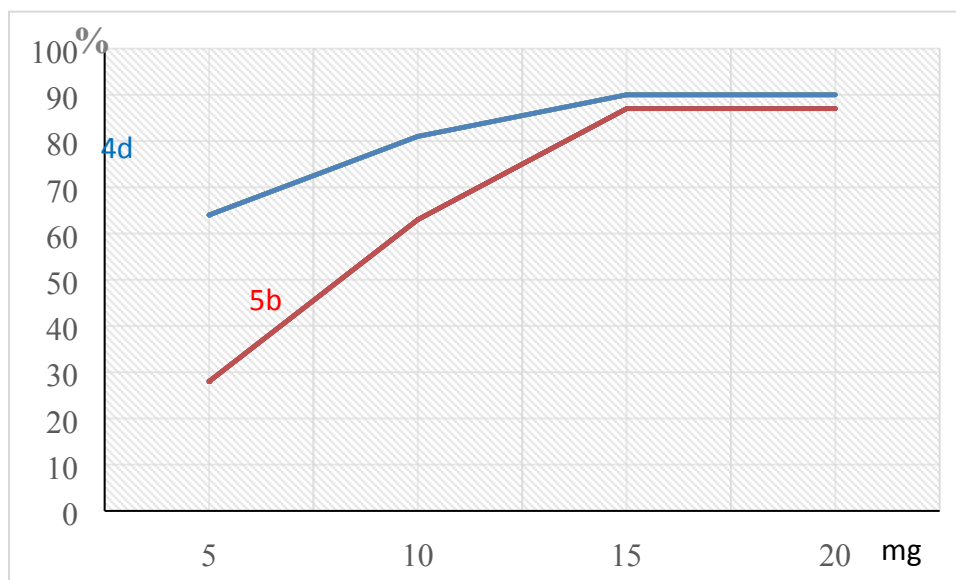
Entry	Catalyst ^a Charged	Solvent	Temp (°C)	Product 4d		Product 5b		
				Time	Yield (%) ^a	Time	Yield (%) ^a	
1	--	--	H ₂ O	90	35 min	23	30 min	9
*	--	--	EtOH 95%	reflux	5 h	53	6 h	35
*	HWSS@Fe ₃ O ₄	15 mg	n-Hexane	reflux	4 h	19	6 h	trace
*	HWSS@Fe ₃ O ₄	15 mg	CH ₂ Cl ₂	reflux	4 h	27	6 h	12
*	HWSS@Fe ₃ O ₄	15 mg	MeCN	reflux	4 h	49	1 h	31
*	HWSS@Fe ₃ O ₄	15 mg	EtOH 95%	reflux	45 min	79	45 min	72
2	HWSS@Fe ₃ O ₄	15 mg	H ₂ O	80	35 min	84	30 min	82
3	HWSS@Fe ₃ O ₄	15 mg	H₂O	90	35 min	90	30 min	87
4	HWSS@Fe ₃ O ₄	15 mg	H ₂ O	90	45 min	90	40 min	87
5	HWSS@Fe ₃ O ₄	15 mg	H ₂ O	100	35 min	88	30 min	86
6	HWSS@Fe ₃ O ₄	15 mg	H ₂ O/EtOH ^b	90	35 min	82	30 min	71
7	HWSS@Fe ₃ O ₄	15 mg	H ₂ O	r.t.	35 min	trace	30 min	--
8	HWSS@Fe ₃ O ₄	15 mg	--	90	35 min	trace	30 min	--
9	HWSS@Fe ₃ O ₄	20 mg	H ₂ O	90	35 min	90	30 min	87
10	HWSS@Fe ₃ O ₄	10 mg	H ₂ O	90	35 min	81	30 min	63
11	HWSS@Fe ₃ O ₄	5 mg	H ₂ O	90	35 min	64	30 min	28
12	HWSS	15 mg	H ₂ O	90	35 min	53	30 min	56
13	Fe ₃ O ₄	15 mg	H ₂ O	90	35 min	41	30 min	36

Reaction conditions: 4-hydroxycoumarin (2 mmol) and 4-chlorobenzaldehyde (1 mmol) in distilled water (2 mL). Dimedone (2 mmol) and 4-chlorobenzaldehyde (1 mmol) in distilled water (2 mL). ^aYields of the isolated products. ^bAqueous ethanol 50%, otherwise stated.

S₂ The original TEM images of HWSS@Fe₃O₄



S₃ The yields of the model products **4d** and **5b** versus the mass of the catalyst



S₄ Magnetic separation of the nano-composite

