NiII NPs entrapped within a matrix of L-glutamic acid cross-linked chitosan supported on magnetic carboxylic acid-functionalized multi-walled carbon nanotube: A new and efficient multi-task catalytic system for the green one-pot synthesis of diverse heterocyclic frameworks

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**Figure S1.** SEM images of (a) f-MWCNT and (b) Fe3O4/f-MWCNT.
S2.1. FT-IR spectrum of 3,3'-(phenylmethylene)bis(4-hydroxy-2H-chromen-2-one)

S2.2. $^1$H NMR (300 MHz) spectrum of 3,3'-(phenylmethylene)bis(4-hydroxy-2H-chromen-2-one)
S2.3. FT-IR spectrum of 3,3’-((4-chlorophenyl)methylene)bis(4-hydroxy-2H-chromen-2-one)

S2.4. $^1$H NMR (300 MHz) spectrum of 3,3’-((4-chlorophenyl)methylene)bis(4-hydroxy-2H-chromen-2-one)
S2.5. FT-IR spectrum of 3,3′-((4-nitrophenyl)methylene)bis(4-hydroxy-2H-chromen-2-one)

S2.6. 1H NMR (300 MHz) spectrum of 3,3′-((4-nitrophenyl)methylene)bis(4-hydroxy-2H-chromen-2-one)
S2.7. FT-IR spectrum of 3,3’-(p-tolylmethylene)bis(4-hydroxy-2H-chromen-2-one)

S2.8. ¹H NMR (300 MHz) spectrum of 3,3’-(p-tolylmethylene)bis(4-hydroxy-2H-chromen-2-one)
S2.9. FT-IR spectrum of 3,3’-((4-methoxyphenyl)methylene)bis(4-hydroxy-2H-chromen-2-one)

S2.10. $^1$H NMR (300 MHz) spectrum of 3,3’-((4-methoxyphenyl)methylene)bis(4-hydroxy-2H-chromen-2-one)
S2.11. FT-IR spectrum of 2-(4-chloro-3-nitrophenyl)-2,3-dihydroquinazolin-4(1H)-one

![FT-IR spectrum of 2-(4-chloro-3-nitrophenyl)-2,3-dihydroquinazolin-4(1H)-one](image)

S2.12. $^1$H NMR (400 MHz) spectrum of 2-(4-chloro-3-nitrophenyl)-2,3-dihydroquinazolin-4(1H)-one

![$^1$H NMR (400 MHz) spectrum of 2-(4-chloro-3-nitrophenyl)-2,3-dihydroquinazolin-4(1H)-one](image)
S2.13. FT-IR spectrum of 3,3,6,6-tetramethyl-9-(3-nitrophenyl)-3,4,5,6,7,9-hexahydro-1H-xanthene-1,8(2H)-dione

S2.14. $^1$H NMR (300 MHz) spectrum of 3,3,6,6-tetramethyl-9-(3-nitrophenyl)-3,4,5,6,7,9-hexahydro-1H-xanthene-1,8(2H)-dione
S2.15. FT-IR spectrum of 9-(2-chlorophenyl)-3,3,6,6-tetramethyl-3,4,5,6,7,9-hexahydro-1H-xanthene-1,8(2H)-dione

S2.16. $^1$H NMR (300 MHz) spectrum of 9-(2-chlorophenyl)-3,3,6,6-tetramethyl-3,4,5,6,7,9-hexahydro-1H-xanthene-1,8(2H)-dione
S2.17. FT-IR spectrum of 2-amino-7,7-dimethyl-5-oxo-4-phenyl-5,6,7,8-tetrahydro-4H-chromene-3-carbonitrile

S2.18. $^1$H NMR (400 MHz) spectrum of 2-amino-7,7-dimethyl-5-oxo-4-phenyl-5,6,7,8-tetrahydro-4H-chromene-3-carbonitrile
S2.19. FT-IR spectrum of 2-amino-4-(4-chlorophenyl)-7,7-dimethyl-5-oxo-5,6,7,8-tetrahydro-4H-chromene-3-carbonitrile

![FT-IR spectrum](image)

S2.20. $^1$H NMR (400 MHz) spectrum of 2-amino-4-(4-chlorophenyl)-7,7-dimethyl-5-oxo-5,6,7,8-tetrahydro-4H-chromene-3-carbonitrile

![NMR spectrum](image)
S2.21. FT-IR spectrum of 2-amino-7,7-dimethyl-4-(4-nitrophenyl)-5-oxo-5,6,7,8-tetrahydro-4H-chromene-3-carbonitrile

![FT-IR spectrum]

S2.22. $^1$H NMR (400 MHz) spectrum of 2-amino-7,7-dimethyl-4-(4-nitrophenyl)-5-oxo-5,6,7,8-tetrahydro-4H-chromene-3-carbonitrile

![$^1$H NMR spectrum]
S2.23. FT-IR spectrum of 2-amino-7,7-dimethyl-4-(3-nitrophenyl)-5-oxo-5,6,7,8-tetrahydro-4H-chromene-3-carbonitrile

S2.24. $^1$H NMR (400 MHz) spectrum of 2-amino-7,7-dimethyl-4-(3-nitrophenyl)-5-oxo-5,6,7,8-tetrahydro-4H-chromene-3-carbonitrile