

An effective D- π -A type donor material based on 4-fluorobenzoylacetonitrile core unit for bulk heterojunction organic solar cells

Shabaz Alam ¹, M. Shaheer Akhtar ², Abdullah ^{1,3}, Eun-Bi Kim ¹, Hyung-Shik Shin ^{1,4,*} and Sadia Ameen ^{3*}

¹ Energy Materials & Surface Science Laboratory, Solar Energy Research Center, School of Chemical Engineering, Jeonbuk National University, Jeonju 54896, Republic of Korea

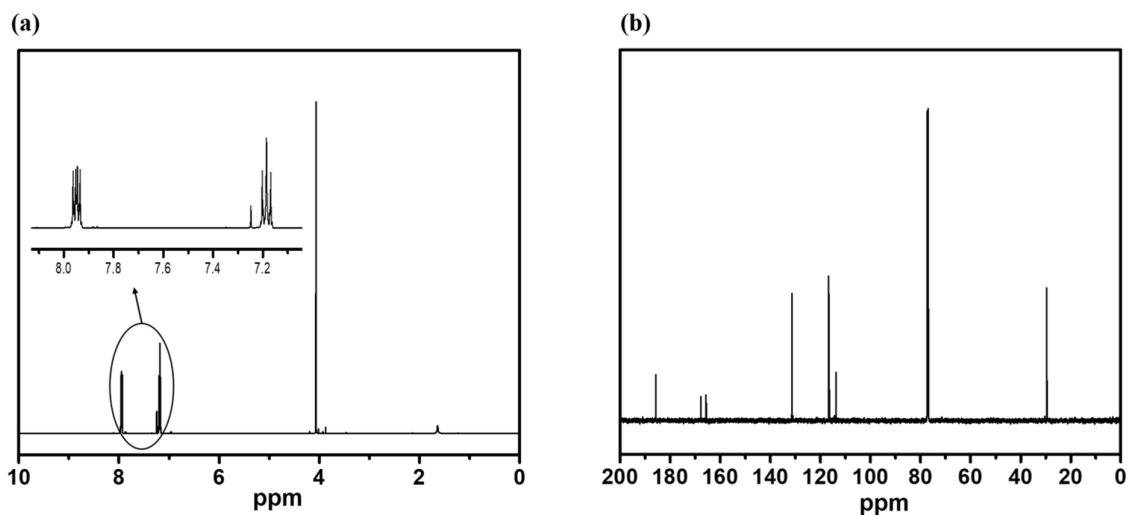
² New & Renewable Energy Material Development Center (NewREC), Jeonbuk National University, Buan-gun 56332, Republic of Korea

³ Advanced Materials & Devices Laboratory, Department of Bio-Convergence Science, Jeongeup Campus, Jeonbuk National University, Jeongeup 56212, Republic of Korea

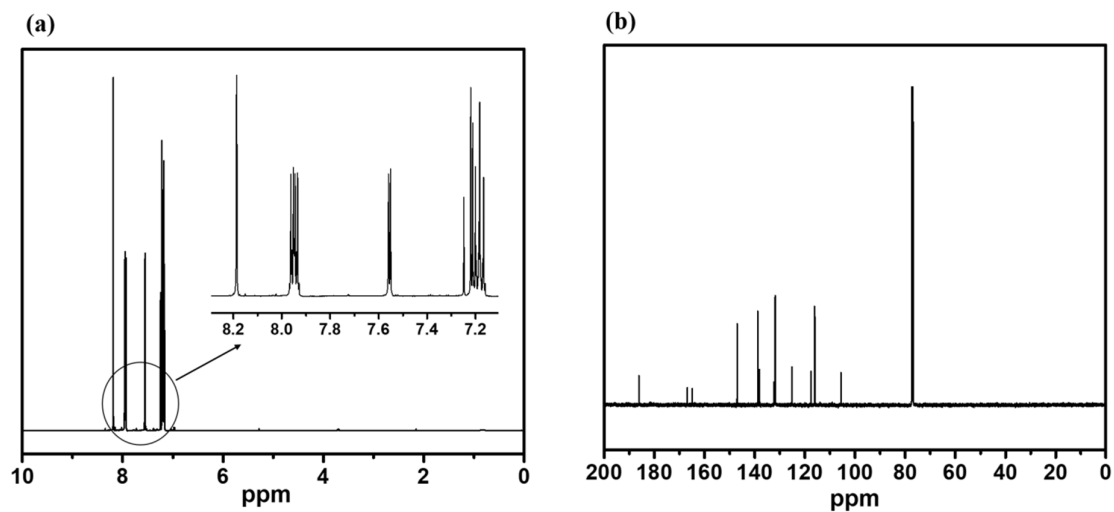
⁴ Korea Basic Science Institute (KBSI), 169-148 Gwahak-ro, Yuseong-gu, Daejeon 34133, Republic of Korea

* Correspondence: sadiaameen@jbnu.ac.kr (S.A.); hsshin@jbnu.ac.kr (H.S.S)
Tel: +82-63-270-2438, Fax: +82-63-270-2306

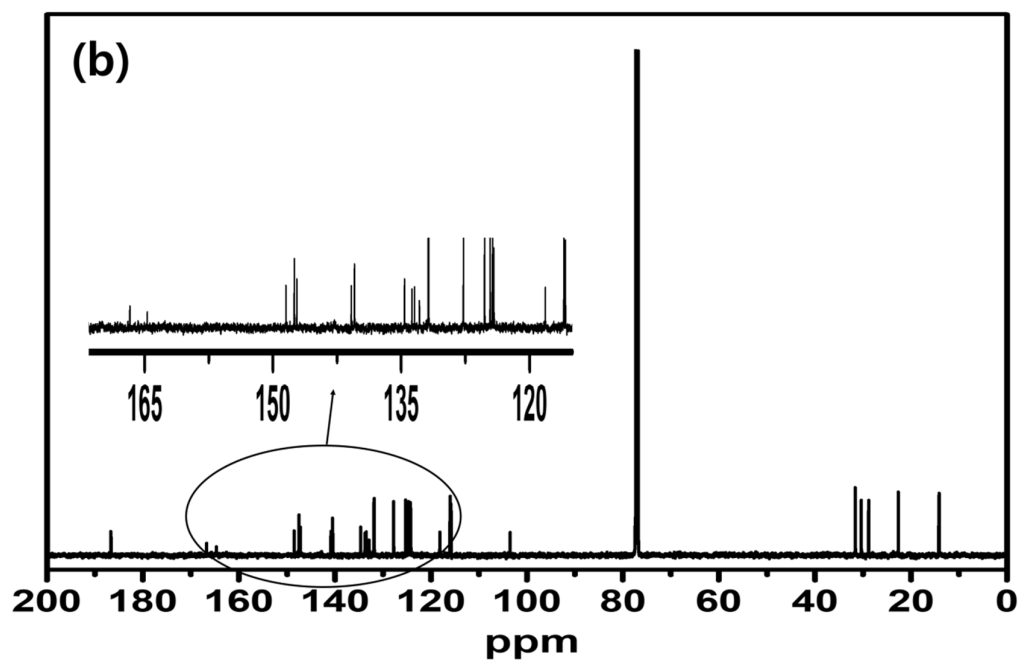
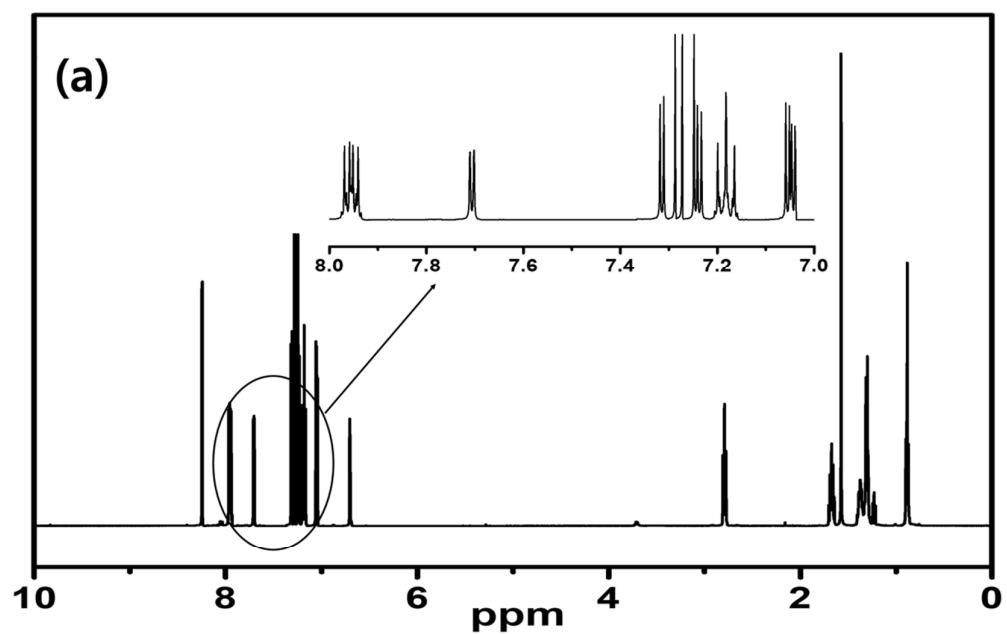
NMR spectrum of intermediate and target molecule



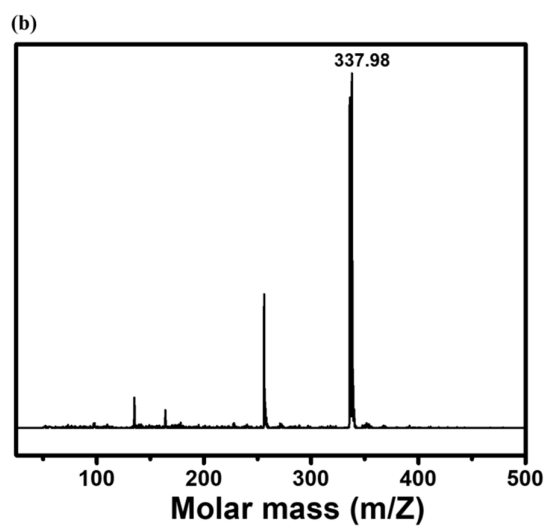
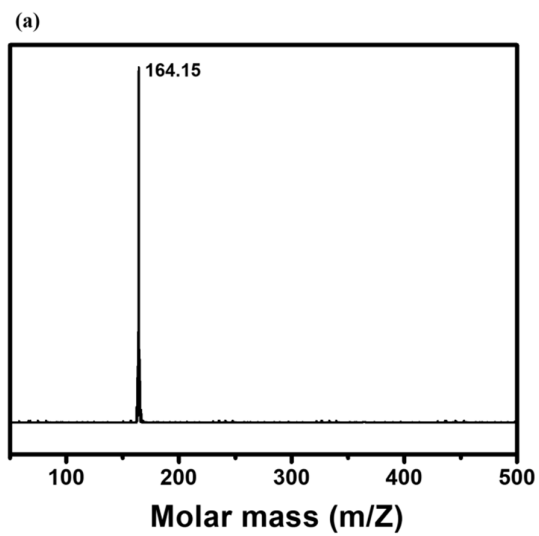
S1: (a) ¹H NMR and (b) ¹³C NMR of 4-fluorobenzoylacetonitrile.



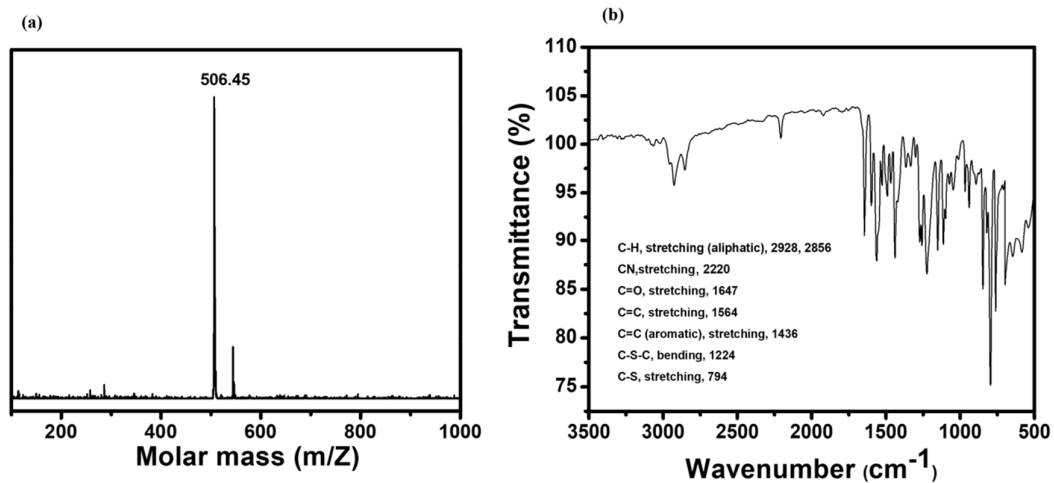
S2: (a) ^1H NMR and (b) ^{13}C NMR of 3-5-(bromothiophen-2-yl)-2-(4-fluorobenzoyl)acrylonitrile.



S3: (a) ^1H NMR and (b) ^{13}C NMR of 2-(4-fluorobenzoyl)-3-(5''-hexyl-[2,2':5',2''-terthiophen]-5-yl)-acrylonitrile (H3T-4-FOP).



S4: (a) Mass spectrum of 4-fluorobenzoylacetonitrile and (b) 3-5(-bromothiophen-2-yl)-2-(4-fluorobenzoyl) acrylonitrile.



S5: (a) Mass spectrum and (b) FTIR spectrum of 2-(4-fluorobenzoyl)-3-(5''-hexyl-[2,2':5',2''-terthiophen]-5-yl)-acrylonitrile (H3T-4-FOP).