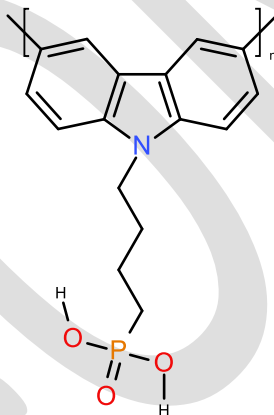


## CERTIFICATE OF ANALYSIS

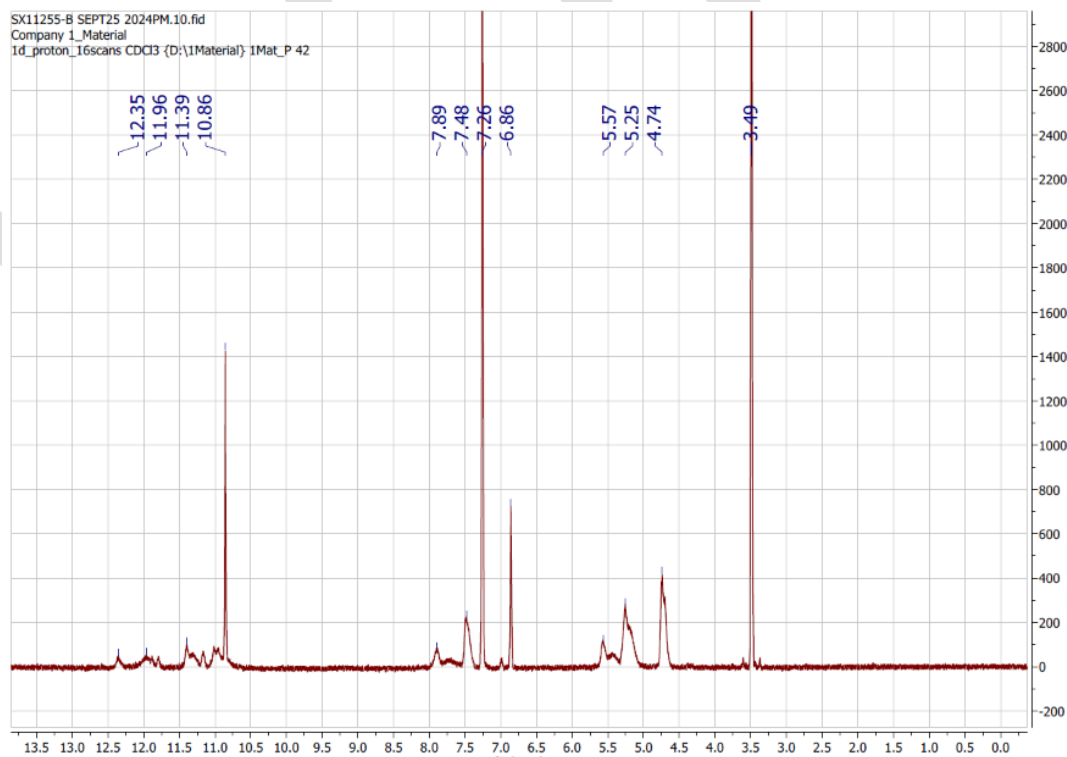
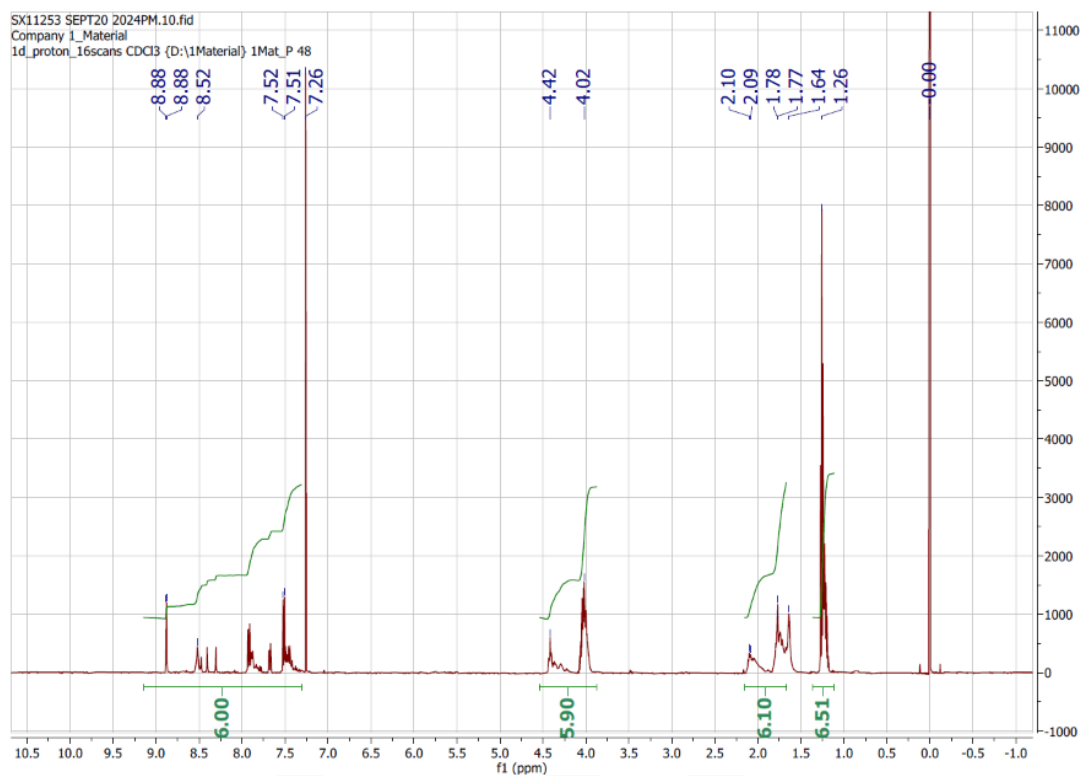
1M Material: Custom made, offered as it is  
Common Name: Poly-4PACz  
Chemical Name: Poly[[[4-(9H-carbazol-9-yl)butyl]phosphonic acid]-3,6-yl]  
Chemical Structure:



Lot number: SX11255  
Appearance: Light yellow to grey solid  
Molecular weight: 10K estimated  
NMR analysis: Structure confirmed  
Handling suggestion: To avoid light radiation and moisture

1-Material is dedicated to providing materials according to our customer's needs, and some materials we promote may be solely offered to certain customers for their specific needs in their research and development projects on a custom synthesis basis or on a contract research basis. All the material is offered as is, along with the information and technical advice—where verbal, in writing or by way of trials—are given in good faith and are believed to be accurate but without warranty since the conditions of use are beyond the control of 1-Material. This also applies where proprietary rights of third parties are involved. For the terms and conditions of our offers and services, please consult the disclaimer in our web: [www.1-material.com](http://www.1-material.com)

## 1M NMR raw data internal reference:



Top: Poly-4PACZ precursor (before hydrolysis); bottom: Poly-4PACz (after hydrolysis)

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Publication data

<https://doi.org/10.1016/j.joule.2023.10.014>

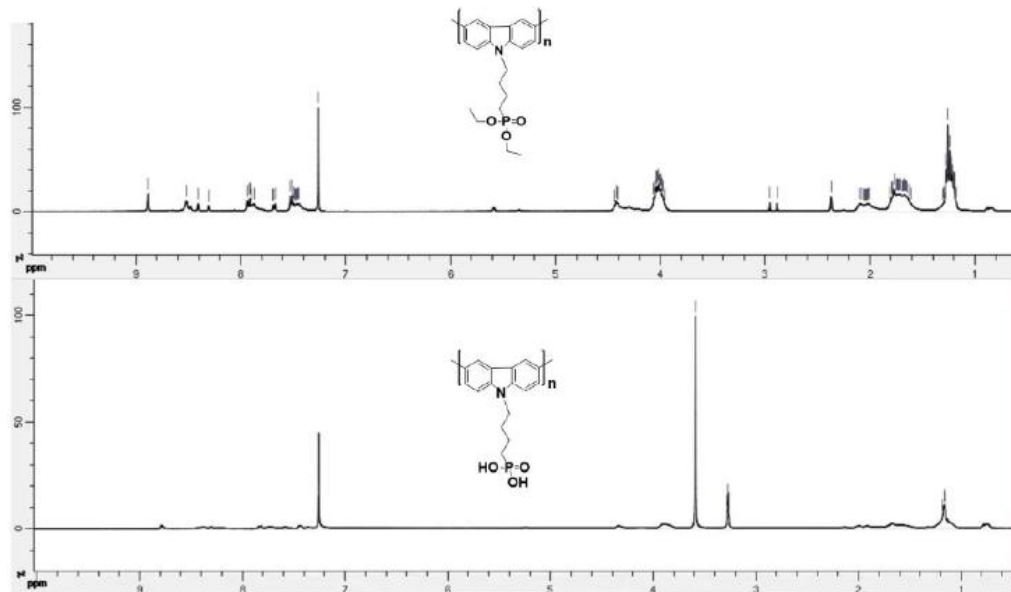
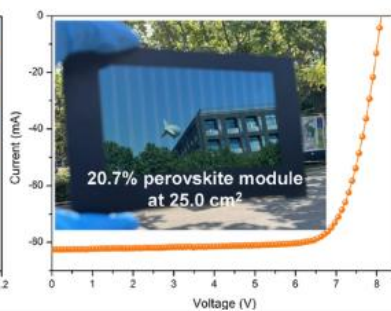
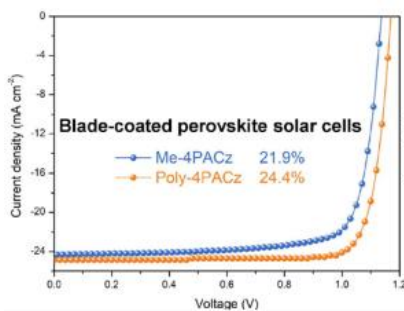
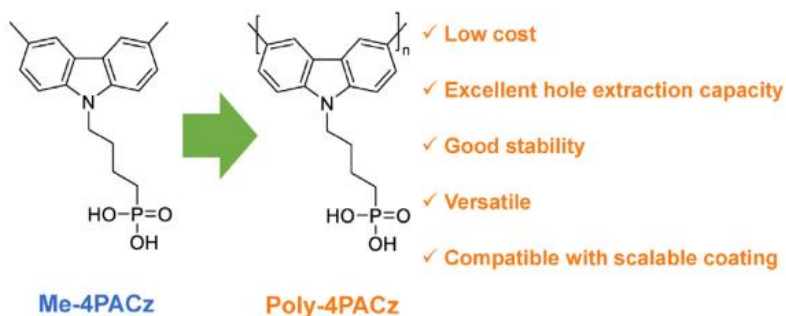


Figure S24.  $^1\text{H}$  NMR spectra of **3** ( $\text{CDCl}_3$ ) and **4** ( $\text{CDCl}_3$  with small amount of  $\text{CD}_3\text{OD}$ ).

**New type of hole-transporting material**



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