

Epstein *et al.* Respond: Audenaert, Gusman, and Deltour (AGD) correctly point out¹ that there are detailed differences between their² earlier conductivity (σ) data and the results in our Letter.³ A direct comparison with AGD was not possible until now since the absolute value of σ was not reported² for their samples. We agree that this difference may arise from our "slowly doped" samples being considerably more homogeneous than AGD's more rapidly doped samples, in accord with our earlier reports.⁴⁻⁶

One must be cautious in detailed analysis of $\sigma(T)$. For variable-range hopping (VHR), Eq. (1) of Ref. 3 should be used, with $\sigma(T) \propto T^{-1/2} \exp[-(T_0/T)^{1/4}]$, not $\sigma(T) \propto \exp[-(T_0/T)^{1/4}]$ as assumed by AGD. In our study³ we had determined $N(E_F)$ from magnetic susceptibility measurements, and, using $T_0 = 16\alpha^3/k_B N(E_F)$, we calculated α^{-1} for each sample. We found that the α^{-1} corresponded to the three-dimensional decay length of solitons in accord with our infrared observation of solitons. The tenfold decrease of T_0 in the AGD samples could not be due to $N(E_F)$ alone as this would imply a metallic density of states inconsistent with VRH. Therefore α^{-1} and $N(E_F)$ probably are both larger in AGD's more highly doped samples. Hence, the localized states involved in transport are unlikely to be of soliton origin as was the case in our study.³ Clearly a detailed correlated study of the structural, optical, magnetic, and transport properties of the AGD-type doped $(\text{CH})_x$ would be necessary to identify the localized states involved in the hopping process at these higher dopant concentrations.

AGD correctly assert¹ that $\sigma(295 \text{ K})$ and $\chi(N(E_F))$ of the doped initially *cis*- $(\text{CH})_x$ films generally are larger than those of *trans*- $(\text{CH})_x$ doped to approximately the same concentration. Our infrared studies have demonstrated⁷ that the doped regions in the *cis* polymer are actually doped *trans* regions, while our x-ray structural studies⁶ have shown that even the undoped regions have converted to the *trans* structure for the concentrations in question. Frequency-dependent conductivity studies of doped *cis* polymer show that multiply connected doped *trans* regions dominate $\sigma(T)$ with no indication of an important role for barriers introduced by undoped *cis* regions^{3,8} as proposed¹ by AGD. A main point of our Letter³ was that the electronic transport arises from a finite Fermi-level density of localized one-electron states which are the result of disordering the Peierls insulator. A simple explanation for

the higher $\sigma(295 \text{ K})$ and $N(E_F)$ of doped *cis*- $(\text{CH})_x$ than doped *trans*- $(\text{CH})_x$ is that there is increased disorder in the doped *cis* polymer because of the large structural changes which occur upon doping, leading to a higher $N(E_F)$ and hence higher $\sigma(295 \text{ K})$, while doping in the *trans* polymer is an intercalation process which may introduce less disorder, lower $N(E_F)$, and hence lower $\sigma(295 \text{ K})$. This suggestion contrasts with that of AGD¹ that the doped *trans*- $(\text{CH})_x$ is more disordered than doped *cis*- $(\text{CH})_x$. As yet there is insufficient data to distinguish if there are specific trends in T_0 and α as a function of doping into *cis* or *trans* structure. The effects of aging on the iodine-doped samples referred to by AGD are unclear as the aged samples are not identified in Ref. 2.

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