Folkes *et al.* Reply: Holtz *et al.* claim [1] that our recent observation [2] of Mahan excitons in the photoluminescence (PL) spectrum of a degenerate two-dimensional electron gas (2DEG) in a single heterojunction quantum well (SHQW) is an incorrect interpretation of our experimental data, primarily because photoexcited holes cannot exist at or near the AlGaAs/GaAs interface of the SHQW. Our data as well as other PL data (Ref. [16] in [2]) strongly indicate that photoexcited holes can be localized at or near the SHQW interface. Although hole localization in the SHQW is not well understood, it is believed that acceptorlike interface states or residual acceptors near the interface can bind photoexcited holes at low temperatures. The calculated [3] binding energy of a hole which is localized by an interface acceptor in a metal-insulator-semiconductor structure with 2DEG density $n_s \sim 2 \times 10^{11}$ cm^{-2} is 2.2 meV; this is consistent with our experimental results. The results of detailed calculations (Ref. [20] in [2]) of the SHQW 2DEG subband energy levels, Fermi energy, and band gap renormalization have been used to show that, for spatially direct recombination of SHQW electrons with holes that are weakly bound at the interface, the expected PL energy agrees with our experimental data. A number of reported results show 2DEG PL energies that range as low as ~1520 meV. These low PL energies can be attributed to band bending which causes spatially indirect electron-hole recombination in modulation doped structures with no hole localization. Residual acceptor concentrations in the nominally undoped GaAs layer less than 10^{14} cm^{-3} can also lower the PL energy (Ref. [20] in [2]).

Note that we observed a 27-meV-wide ionized-impurity-scattering-broadened PL signal (Ref. [19] in [2]) from the doped QW at temperatures T as high as 80 K. The narrow width of the 1550.2 and 1553.3 meV resonances and the fact that we do not observe the 1556–1540 meV PL at $T \geq 32$ K strongly indicate that this PL does not arise from the recombination of SHQW electrons with photoexcited holes in the heavily doped QW.

The suggestion of Holtz *et al.* that the 1550.2 and 1553.3 meV resonances [Fig. 2(b) in [2]) can be attributed to the $n = 2$ subband enhancement of the Fermi edge singularity (FES) [4] and an $n = 2$ subband exciton, respectively, is inconsistent with our experimental data and other published experimental and theoretical results. The $n = 2$ subband enhanced FES is observed only when the Fermi surface is nearly degenerate with the second subband [4]. For lower n_s the PL spectrum is dominated by the $n = 1$ subband PL [4]; at higher n_s, where $n = 2$ subband is occupied, the $n = 2$ and $n = 1$ emission is invariably observed in the PL (Refs. [5] and [16] in [2]). Calculations (Ref. [20] in [2]) and experimental data [5,6] show that for $n_s \sim 2 \times 10^{11}$ cm^{-2} the separation between the $n = 1$ and $n = 2$ subbands is ~20 meV. If we were observing an $n = 2$ subband enhanced FES at 1550.2 meV, then as n_s decreased we should observe the $n = 1$ PL at ~1530 meV. This is not what we observe. At $V_g = -147$ V (corresponding to $n_s \approx 1.4 \times 10^{11}$ cm^{-2}) the 1550.2 meV resonance is quenched and we observe a 5-meV-wide pulselike PL feature over the range 1554–1548 meV with no low energy tail [Fig. 2(b) in [2]). These data are consistent with our interpretation that it is the PL from the spatially direct recombination of free $n = 1$ subband electrons in the SHQW with photoexcited holes which are localized at or near the SHQW interface and prove that the 1550.2 meV resonance which is observed for $-120 \leq V_g \leq -45$ V is not an $n = 2$ subband enhanced FES. Calculations of the SHQW FES [2] show that for $n_s \sim 2 \times 10^{11}$ cm^{-2} the Fermi edge enhancement in the PL is small and insensitive to small changes in n_s and thus cannot explain our data. Furthermore, measurements have clearly shown that the $n = 2$ subband exciton is less sensitive to increasing temperature than the $n = 2$ subband enhanced FES (Ref. [6] in [2]). However, our temperature dependence data show that the 1550.2 meV resonance decreases with increasing temperature at a slightly smaller rate than that of the 1553.3 meV exciton. The abrupt disappearance of the 1553.3 meV exciton when n_s is increased by approximately 2.5×10^9 cm^{-2} (see Fig. 3 in [2]) strongly indicates that it is an $n = 1$ subband Mahan exciton and that phase space filling is important.

In concluding, we reiterate that the suggested interpretation of Holtz *et al.* does not explain our observations.

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