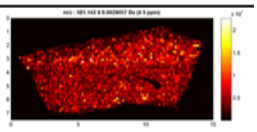
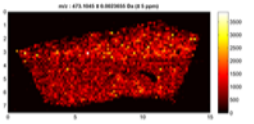
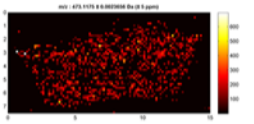
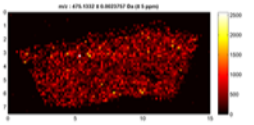
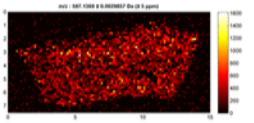
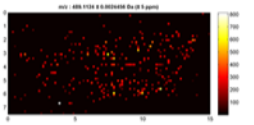
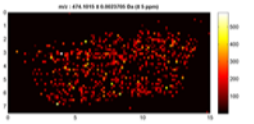
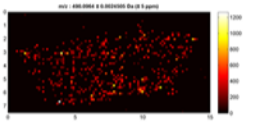
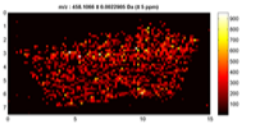
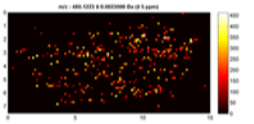
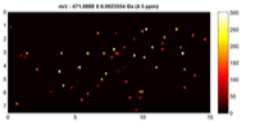
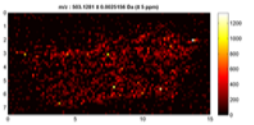
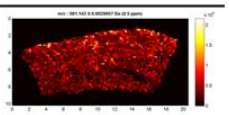
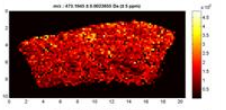
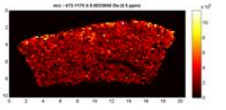
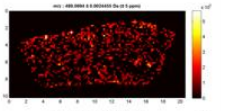
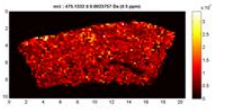
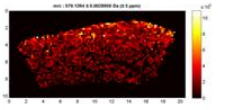
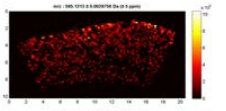
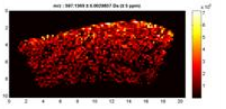
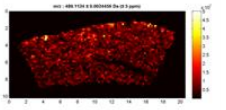
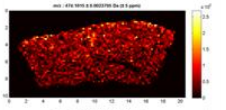
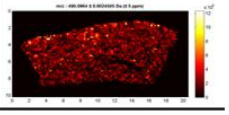
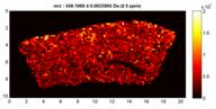
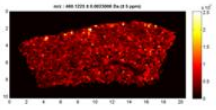
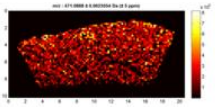
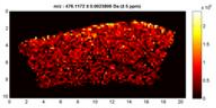
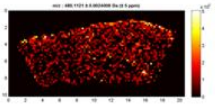
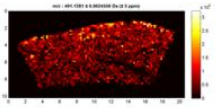
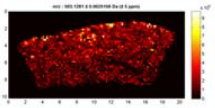
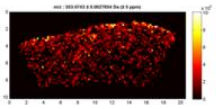
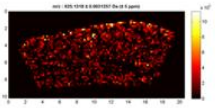
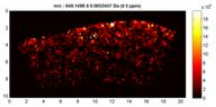
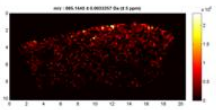
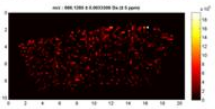
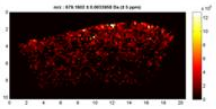
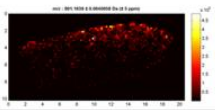
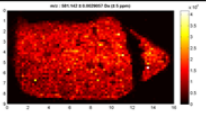
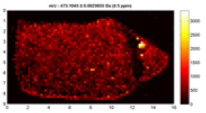
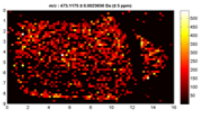
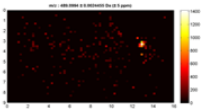
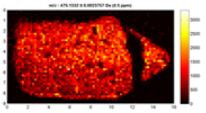
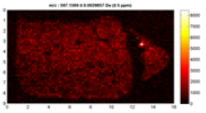
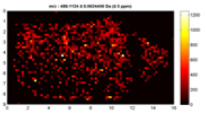
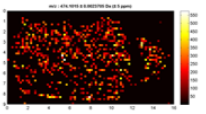
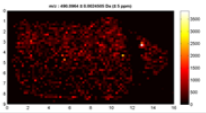
DRM	Formula	Exact Mass $[M+H]^+$	Distribution
Lapatinib	$C_{29}H_{26}ClFN_4O_4S$	581.1420	
M1	$C_{22}H_{21}ClN_4O_4S$	473.1045	
M2	$C_{26}H_{18}ClFN_4O_2$	473.1175	
M4	$C_{26}H_{20}ClFN_4O_2$	475.1332	
M8	$C_{29}H_{26}ClFN_4O_5S$	597.1369	
M9/10	$C_{26}H_{18}ClFN_4O_3$	489.1124	
M11	$C_{26}H_{17}ClFN_3O_3$	474.1015	
M12	$C_{26}H_{17}ClFN_3O_4$	490.0964	
	$C_{26}H_{17}ClFN_3O_2$	458.1066	
	$C_{26}H_{19}ClFN_3O_2$	460.1223	
	$C_{22}H_{19}ClN_4O_4S$	471.0888	
	$C_{27}H_{20}ClFN_4O_3$	503.1281	

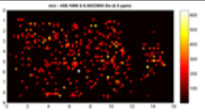
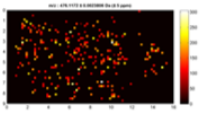
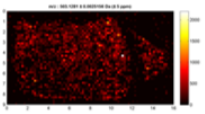
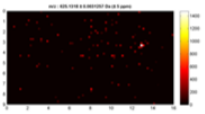
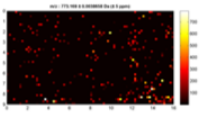
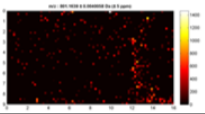
Supplemental Fig. S1 Ion maps for all drug related material (lapatinib and metabolites) that were observed from the preliminary IR-MALDESI MSI analysis

DRM	Formula	Exact Mass $[M+H]^+$	Distribution
Lapatinib	$C_{29}H_{26}ClFN_4O_4S$	581.1420	
M1	$C_{22}H_{21}ClN_4O_4S$	473.1045	
M2	$C_{26}H_{18}ClFN_4O_2$	473.1175	
M3	$C_{22}H_{21}ClN_4O_5S$	489.0994	
M4	$C_{26}H_{20}ClFN_4O_2$	475.1332	
M5	$C_{29}H_{24}ClFN_4O_4S$	579.1264	
M6/7	$C_{29}H_{24}ClFN_4O_5S$	595.1213	
M8	$C_{29}H_{26}ClFN_4O_5S$	597.1369	
M9/10	$C_{26}H_{18}ClFN_4O_3$	489.1124	
M11	$C_{26}H_{17}ClFN_3O_3$	474.1015	
M12	$C_{26}H_{17}ClFN_3O_4$	490.0964	

DRM	Formula	Exact Mass $[M+H]^+$	Distribution
	$C_{26}H_{17}ClFN_3O_2$	458.1066	
	$C_{26}H_{19}ClFN_3O_2$	460.1223	
	$C_{22}H_{19}ClN_4O_4S$	471.0888	
	$C_{22}H_{19}ClN_4O_4S$	476.1172	
	$C_{25}H_{19}ClN_3O_4$	480.1121	
	$C_{26}H_{20}ClFN_4O_3$	491.1281	
	$C_{27}H_{20}ClFN_4O_3$	503.1281	
	$C_{26}H_{18}ClFN_4O_5S$	553.0743	
	$C_{30}H_{26}ClFN_4O_5S$	625.1318	
	$C_{32}H_{26}ClFN_4O_8$	649.1496	
	$C_{32}H_{26}ClFN_4O_9$	665.1445	
	$C_{32}H_{25}ClFN_3O_{10}$	666.1285	
	$C_{33}H_{28}ClFN_4O_9$	679.1602	
	$C_{36}H_{34}ClFN_4O_{12}S$	801.1639	

Supplemental Fig. S2 Ion maps for all drug related material (lapatinib and metabolites) that were observed from the UV-MALDI MSI analysis

DRM	Formula	Exact Mass $[M+H]^+$	Distribution
Lapatinib	$C_{29}H_{26}ClFN_4O_4S$	581.1420	
M1	$C_{22}H_{21}ClN_4O_4S$	473.1045	
M2	$C_{26}H_{18}ClFN_4O_2$	473.1175	
M3	$C_{22}H_{21}ClN_4O_5S$	489.0994	
M4	$C_{26}H_{20}ClFN_4O_2$	475.1332	
M8	$C_{29}H_{26}ClFN_4O_5S$	597.1369	
M9/10	$C_{26}H_{18}ClFN_4O_3$	489.1124	
M11	$C_{26}H_{17}ClFN_3O_3$	474.1015	
M12	$C_{26}H_{17}ClFN_3O_4$	490.0964	

DRM	Formula	Exact Mass $[M+H]^+$	Distribution
	$C_{26}H_{17}ClFN_3O_2$	458.1066	
	$C_{22}H_{19}ClN_4O_4S$	476.1172	
	$C_{27}H_{20}ClFN_4O_3$	503.1281	
	$C_{30}H_{26}ClFN_4O_5S$	625.1318	
	$C_{35}H_{34}ClFN_4O_{11}S$	773.1690	
	$C_{36}H_{34}ClFN_4O_{12}S$	801.1639	

Supplemental Fig. S3 Ion maps for all drug related material (lapatinib and metabolites) that were observed from the optimized IR-MALDESI MSI analysis